50TH ANNIVERSARY YEAR

Skeptical Inquirer

SINCE 1976 — THE MAGAZINE FOR SCIENCE AND REASON

Vol. 50, No. 2 | March/April 2026

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THE COMMITTEE FOR THE SCIENTIFIC INVESTIGATION OF CLAIMS OF THE PARANORMAL
Skeptical Inquirer
PO Box 703 Amherst, New York 14226-0703 USA
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The Skeptical Inquirer (ISSN 0194-6730) is published bimonthly by the Center for Inquiry in association with the Committee for Skeptical Inquiry, P.O. Box 703, Amherst, NY 14226. Printed in U.S.A. Periodicals postage paid at Buffalo, NY, and at additional mailing offices. Subscription prices: one year (six issues), $35; two years, $60; three years, $84; single issue, $5.99. Canadian and foreign orders: Payment in U.S. funds drawn on a U.S. bank must accompany orders; please add US$10 per year for shipping. Canadian and foreign customers are encouraged to use Visa or Master Card.

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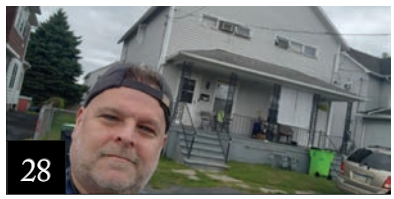

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[FROM THE EDITOR

Cheers to Our Columnists!

As part of our fiftieth anniversary celebration, this issue of Skeptical Inquirer celebrates our columnists. The first SI column, Robert Sheaffer's "Psychic Vibrations," began in 1978 (Vol. 2, no. 2), and the second column, Martin Gardner's "Notes of a Psi-Watcher," didn't begin until 1983 (Vol. 7, no. 4).

In 1995—the same year SI increased to a bimonthly distribution and expanded to a standard magazine size—more columns were added and authored by notable skeptics, such as C. Eugene Emery. Jr. ("Media Watch") and Joe Nickell ("Investigative Files"). Over the years, some columns were short-lived, while others spanned decades. The impressive list of former columnists includes Stephen Barrett, Ralph Estling, Matt Nisbet, Massimo Pigliucci, Chris Mooney, Robert Epstein, Kenneth Krause, Steven Novella, James Randi, and Harriet Hall (listed in the order their columns began).

Along the way, several online columnists joined the team to create even more enthralling content for skepticalinquirer.org. Today, our digital-only columnists include Luis Alfonso Gámez, Susan Gerbic, William Matthew London, Rob Palmer, Wendy Grossman, Autumn Sword, and Nick Tiller. We're also delighted to announce that we've added a new digital-only column this year: "Investigate the Fringe" by Dan Wilson.

The cover of this issue lists the newest column from each of our current print columnists, and, like every issue, these columns embrace skeptical inquiry from many different angles.

Some of the columns are retro- or introspective. Massimo Polidoro takes us back to the formation of the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP) while Stuart Vyse and Craig Foster reflect on their own journeys as columnists.

Some of the columns reflect on the misinformation that is prevalent today. Ben Radford dives into the harms of unfounded conspiracy theories, and Andrea Love explores the harms of one type of chemophobia.

Some of the columns are brand new. We're thrilled to share the first columns from Kenny Biddle and Melanie Trecek-King! They've both written for SI before, but from now on we'll enjoy their new regular columns, "Biddle Me This" and "The Missing Think."

Some of the columns tackle the big-picture topics. Robyn Blumner demonstrates the necessity of an evidence-based worldview, and Mick West considers the possibility that skeptics just might save the world.

One thing is for certain: if the world is to be saved, it will be thanks to the curious minds of people like SI's columnists—thinkers who examine the world from different viewpoints with their specialized skills due to a deep compassion for others. Our columnists chronicle their own curiosity and the curiosity of the luminaries of our time. They collect, consider, and critique the best—and the worst—ideas of humankind. They are truly skeptical inquirers.

—Stephen Hupp

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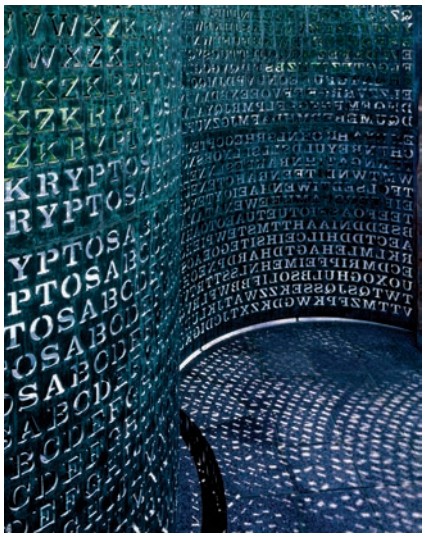
Our Vision: A world where people value evidence and critical thinking, where superstition and prejudice subside, and where science and compassion guide public policy.
Our Values: Integrity, Courage, Innovation, Empathy, Learning, and Wonder.

News Bites: From the Kryptos Sculpture's Secret to the American Academy of Pediatrics' Lawsuit

Stephen Hupp and William Matthew London



Kryptos by James Sanborn is one of three sculptures at the George Bush Center for Intelligence. It runs a theme of information gathering and includes an encoded copper screen.

***Kryptos* Sculpture Solution Sells for Nearly $1 Million.** On November 20, 2025, the full solution to the code hidden in the *Kryptos* sculpture sold for $962,500. For decades, the sculpture has spurred intrigue related to cryptography, the practices of writing and solving secret codes. Dedicated in 1990 at the CIA headquarters in Virginia, three of four coded messages have since been deciphered; however, the solution for the fourth message has eluded amateur and professional cryptographers alike. At eighty, sculptor Jim Sanborn decided it was time for someone else to learn the secret, and an anonymous bidder paid a hefty sum for the privilege. (For more, read "Anonymous Bidder Pays Nearly $1 Million for Secret to Decode C.I.A. Sculpture" at nytimes.com.)

FTC Reports Increased Scamming of Older Adults. On December 1, 2025, the Federal Trade Commission (FTC) released a report to Congress demonstrating a fourfold increase in losses to fraud for adults ages sixty and over, largely driven by losses over $100,000. The losses were often due to investment scams, romance scams, or impersonations. Compared to younger adults, older adults were more likely to lose money on tech support scams; prize, sweepstakes, and lottery scams; romance scams; and government impersonation scams. The report also described the law enforcement actions against debt relief schemes, tech support scams, false and unsubstantiated health and product claims, and undisclosed fees for senior housing. The FTC also described its fraud prevention education efforts in collaboration with governmental and nongovernmental agencies. (For more, read "Protecting Older Consumers 2024–2025" at ftc.gov.)

NASEM Identifies Science Priorities for Humans on Mars. On December 9, 2025, the National Academies of Sciences, Engineering, and Medicine (NASEM) released a report that identified the search for evidence of existing or past life on Mars as the highest of eleven science priorities for the first human mission to Mars. Other science priorities include improving our understanding of the effects of Mars's environment on humans, plants, and animals; water cycles; geologic records; and dust storms. According to the press release, "the report presents four possible campaigns for human exploration of Mars, each encompassing a sequence of three missions linked to specific science objectives. For each campaign, the report describes which science objectives could be met, the likely roles of crew members, and the campaign's strengths and weaknesses for meeting scientific goals." (For more, see "A Science Strategy for the Human Exploration of Mars" at nationalacademies.org.)

The 3I/ATLAS Comet Passes Earth. On December 19, 2025, the comet dubbed 3I/ATLAS passed by Earth. This comet is notable because it's only the third time an interstellar object has been confirmed as having passed through our solar system. "3I" stands for "third interstellar" object, and "ATLAS" comes from the Asteroid Terrestrial-Impact Last Alert System, which first discovered the comet in July 2025. Soon after its discovery, astrophysicist Avi Loeb suggested the comet could be an extraterrestrial spacecraft; however, mainstream scientists continue to confirm that the object is indeed a comet. (For more, view "Is It a Comet or Alien Technology?" by Neil deGrasse Tyson on youtube.com.)

American Academy of Pediatrics Sues Health and Human Services. On December 24, 2025, the American Academy of Pediatrics (AAP) sued the Department of Health and Human Services (HHS) for cutting nearly $12 million in grant funding. The funding would have been used to prevent infant deaths, promote adolescent mental health, and benefit youth in several other ways. The AAP claimed that HHS is retaliating because of their criticism of new anti-vaccination stances of the Centers for Disease Control (CDC), such as the recommendation to stop administering the universal dose of the hepatitis B vaccine to newborns. The new CDC recommendations are consistent with the anti-vaccine claims by the secretary of HHS, Robert F. Kennedy Jr. (For more, read "Pediatrics Group Sues HHS for Cutting Funds for Children's Health Programs" at nbcnews.com.) ■

Stephen Hupp is the executive director of CSI and editor of Skeptical Inquirer.

William Matthew London is the editor of *Consumer Health Digest*, Quackwatch's free weekly electronic newsletter.

COMMENTARY]

RFK Jr. Continues to Oppose Science and Undermine Public Health as HHS Secretary

WILLIAM MATTHEW LONDON

When President-Elect Trump nominated Robert F. Kennedy Jr. for the position of secretary of the Department of Health and Human Services (HHS), the Center for Inquiry (CFI) responded in opposition. The CFI Office of Consumer Protection from Pseudoscience explained that Kennedy's nomination must be opposed due to his record of spreading alarmist claims about vaccines and conventionally grown produce. CFI President and CEO Robyn Blumner issued a statement that said, in part: "As an organization dedicated to promoting the life-saving power of evidence-based science to improve and lengthen lives, the Center for Inquiry finds Kennedy's nomination completely unacceptable. This may very well be the worst possible choice the incoming president could make for the vital job of protecting public health."

CFI called on its supporters to tell their senators to vote against confirming the Kennedy nomination and created the RFK Jr. Watch information archive to document his record of spreading distrust in well-established scientific findings.

Following the Senate's confirmation of Kennedy as HHS Secretary, CFI renamed the archive HHS Watch (at quackwatch.org/hhs-watch/). Resources in the archive show how Kennedy has brought chaos to HHS agencies and endangered the public. Barry Karr (who retired as CSI's executive director in July) and I have been the content curators for the archive. We tried to be selective to avoid posting excessive content to the archive, but Kennedy and HHS overwhelmed us with a firehose of falsehoods, a miasma of misinformation, and a plethora of perplexing personnel picks. On June 27, the misinformation-monitoring organization NewsGuard reported that since his first confirmation hearing on January 29, Kennedy advanced twelve false claims on X (formerly Twitter) that were viewed a total of twenty-five million times.

We wound up posting links to more than 440 news and news analysis pieces through November 2025, more than one per calendar day. I have also included several stories about Kennedy and HHS in issues of *Consumer Health Digest* (https://quackwatch.org/about/chd/), the free weekly newsletter of CFI's Quackwatch. I don't have space here to provide an exhaustive summary of anti-scientific pronouncements and policy actions of HHS under Kennedy, but I can discuss a few examples of him disserving the public rather than, as he claims, "making America healthy again."

Measles Mindlessness

After a child died of measles in late February 2025, Kennedy falsely claimed vitamin A and cod liver oil could be used to prevent or treat measles. He published an opinion piece on Fox News Digital in early March 2025, citing a study and a Centers for Disease Control and Prevention (CDC) notice to support his claims that "vitamin A can dramatically reduce measles mortality," but that finding is applicable where vitamin A deficiency is common—not in the United States. *USA Today* reported in April 2025 that several children who were recently hospitalized in west Texas due to measles complications were found to have vitamin A toxicity and were treated for it.

In a March 11, 2025, interview with Fox's Sean Hannity, Kennedy falsely claimed measles vaccination causes deaths every year and all the complications that measles causes. According to the Infectious Diseases Society of North America, no deaths have been related to the measles, mumps, and rubella (MMR) vaccine given to healthy people. When healthy people are vaccinated, they help protect immunocompromised people who cannot be vaccinated. But vaccination rates in the United States have declined well below the 95 percent threshold needed to prevent virus transmission.

According to the CDC, as of December 9, a total of 1,912 cases of measles in 2025 were confirmed in the United States, the most since 1992. Of those cases, 11 percent were hospitalized, and three deaths have been confirmed.

Expunging Experts

On June 9, Kennedy removed all seventeen sitting members of the Advisory Committee on Immunization Practices (ACIP). Kennedy chose as replacements people with far less relevant expertise on vaccinations than the previous members. Among them are individuals with records of spreading misinformation about vaccines, such as Vicky Pebsworth, who believes MMR vaccination caused her son's autism. Pebsworth is a board member of the National Vaccine Information Center, an anti-vaccination organization. Several medical and scientific organizations have issued statements critical of Kennedy's purging of the vaccine panel (see *Consumer Health Digest*, Issue #35-24).

An independent review evaluating ACIP processes, deliberations, and votes using a standardized tool found that ACIP's overall policymaking maturity rating fell from 100 percent to 58 percent ("developing" or "intermediate") from April to September 2025 (Van Beusekom 2025). Four concerns that limit the replacement committee's ability to make effective vaccine policy

recommendations were identified: "(1) removal of choice for previously recommended vaccines, limiting opportunities to improve health; (2) focus on theoretical vaccine harms using low-quality data; (3) loss of vaccine science and clinical expertise; and (4) less transparency and independence."

Observers noted the lack of evidence-based decision-making at ACIP's meeting held in September (Santhanam 2025). Three distinguished health policy experts recently criticized the CDC's acting director's endorsement of ACIP's recommendation "making COVID-19 vaccination of older adults and other high-risk individuals a matter of so-called shared clinical decision-making (SCDM) rather than a definitive recommendation." They called it an "abdication of responsibility" given the evidence of substantial benefit and minimal risks from the vaccine (Frieden et al. 2025).

Kennedy supported President Trump's nomination of Susan Monarez, PhD (in microbiology and immunology), to serve as CDC director. Monarez was confirmed by the Senate in July. But less than a month later, the Trump administration fired her after she refused to resign under pressure from Kennedy. That day, four high-level CDC officials resigned in protest saying Kennedy and Trump's leadership had made it impossible for them to do their jobs properly.

In September, sixty-one health and advocacy organizations sent President Trump a letter urging him to immediately fire Kennedy, calling him the "source of chaos" at the United States' top health agency. It also called on Trump to replace Kennedy with someone who has a "demonstrated track record of experience and integrity." It stated that Kennedy continues to undermine Americans' health while sowing mistrust and limiting access to vaccines. It pointed to alarming moments under Kennedy's watch, including the mishandling of the 2025 measles outbreak, cuts to billions of dollars in grant money, thousands of firings at the National Institutes of Health (NIH), and the firing of Monarez.

Monarez testified at a Senate hearing that she had refused to comply with Kennedy's demand that she "commit in advance to approve every ACIP recommendation regardless of the scientific evidence" and his direction to "dismiss career officials responsible for vaccine policy without cause."

Jim O'Neill, a Kennedy ally who had served as the deputy secretary of HHS, became the acting CDC director following the firing of Monarez. He is neither a physician nor a scientist. He has been a Silicon Valley investor in supposed anti-aging initiatives and an entrepreneur who has advocated for unproven COVID-19 treatments, such as ivermectin.

On September 26, O'Neill wrote on X: "Thank you @POTUS. I call on vaccine manufacturers to develop safe monovalent vaccines to replace the combined MMR and 'break up the MMR shot into three totally separate shots.'" In other words, based on no evidence of problems with the safety and effectiveness of MMR vaccines, he called for making vaccination more expensive and it less likely for children to get the required two doses of each individual vaccine.

Tylenol Tirades

O'Neil's message quoted an alarmist Truth Social post from President Trump that in part warned in all caps against giving pregnant women Tylenol unless absolutely necessary and against giving Tylenol to young children. September 26 was also the day President Trump and Kennedy officially announced a potential association between acetaminophen (the active ingredient in Tylenol) use during pregnancy and adverse neurodevelopmental outcomes. The FDA issued a news release stating that it was initiating a label change for acetaminophen "to reflect evidence suggesting that the use of acetaminophen by pregnant women may be associated with an increased risk of neurological conditions such as autism and ADHD in children." *May be associated* should be recognized as also meaning *may not be associated*. And *associated* does not mean there's a causal relationship. The FDA ought to recognize that the proposed labeling change would only serve to confuse consumers. The real take-home message is the last paragraph of the FDA's news release:

> It is important to note that while an association between acetaminophen and neurological conditions has been described in many studies, a causal relationship has not been established and there are contrary studies in the scientific literature. It is also noted that acetaminophen is the only over-the-counter drug approved for use to treat fevers during pregnancy, and high fevers in pregnant women can pose a risk to their children. Additionally, aspirin and ibuprofen have well-documented adverse impacts on the fetus.

Nevertheless, at the October 9 Cabinet meeting, Kennedy said, "Anybody who takes the stuff [Tylenol] during pregnancy unless they have to is irresponsible." He supported his assertion by referring to studies on rodents rather than people.

He also said at the meeting, "There's two studies that show children who are circumcised early have double the rate of autism. It's highly likely because they are given Tylenol." He didn't cite the studies, but there is no clear link between circumcision and autism in the literature. One study showed a correlation between autism rates and circumcision rates in eight countries, but that study was not designed to investigate whether individuals who were circumcised were more likely than uncircumcised individuals to develop autism. A cohort study using data from the Danish Civil Registration System reported that compared to uncircumcised boys, ritually circumcised boys from mostly Muslim families had higher (but less than double) the risk of autism in the first four years of life, but also no significantly higher risk from ages five to nine years. The researchers noted the hypothesis that prolonged exposure to acetaminophen *in utero* or in early life has limited support. They criticized the researchers of the eight-country study for their questionable assumption that boys undergoing circumcision always receive acetaminophen to curb pain. It's the same questionable assumption Kennedy made.

Spreading a false alarm about acetaminophen seems to be Kennedy's inane fulfillment of the brazen pledge he made in early April of "a massive test-

ing and research effort" so that "by September, we will know what has caused the autism epidemic and we'll be able to eliminate those exposures." Kennedy refuses to acknowledge that the main reasons children are more frequently identified with autism is the broadening of the definition of autism spectrum disorder and increased efforts at case finding. He ignores overwhelming evidence pointing to genetic causes of autism. He ignores research investigating how non-genetic factors associated with autism work in conjunction with genetics. Those factors include premature birth, having an older parent, prenatal exposures (including some drugs but not acetaminophen or vaccines), and maternal metabolic disorders.

On October 28, Texas Attorney General Ken Paxton sued Johnson & Johnson and Kenvue, the makers of Tylenol, for allegedly knowingly hiding the drug's supposed links to autism and attention-deficit/hyperactivity disorder. The next day, Kennedy announced that evidence does not show that Tylenol definitively causes autism but that it should still be used cautiously. That message is not likely to counteract the alarm he spread by demonizing the medication. Expert medical organizations continue to recommend taking acetaminophen when needed during pregnancy in consultation with doctors. They warn that untreated fever during pregnancy poses significant maternal and infant health risks.

Reviving the Debunked Vaccine-Autism Link

In late November, the CDC made egregious changes to its "Autism and Vaccines" information webpage. In an interview with *The New York Times*, Kennedy admitted that he instructed the CDC to abandon the webpage's longstanding main point: "Studies have shown that there is no link between receiving vaccines and developing autism spectrum disorder (ASD)." The main point of the revised webpage is "The claim 'vaccines do not cause autism' is not an evidence-based claim because studies have not ruled out the possibility that infant vaccines cause autism." Details about false and misleading statements on the revised page were provided by several fact-checkers. Like many science, health, and disability organizations, CFI issued a statement condemning the webpage revisions. (Links to various objections to the revisions were offered in Issue #25-47 of *Consumer Health Digest*, available at quackwatch.org.)

ACIP Abandons Universal Recommendation for Hepatitis B Vaccination for Newborns

In early December, Kennedy's appointees on the CDC's vaccine advisory committee members voted 8 to 3 to no longer recommend vaccinating all newborns against hepatitis B. Dozens of medical societies, patient advocacy groups, and deans of public health signed onto statements objecting to the decision. (See Issue #25-47 of *Consumer Health Digest*, available at quackwatch.org.) According to one of the statements: "ACIP's decision to downgrade the longstanding recommendation to vaccinate all newborns against hepatitis B at birth will lead to more childhood hepatitis B infections, will lead to more chronic infections that will follow patients into adulthood, and will complicate vaccine access for children. No new data was presented during the ACIP meeting to justify this change."

Bracing for the Worst

I'm afraid the worst from Kennedy's leadership is yet to come.

In July, Kennedy pledged to "fix" the National Vaccine Injury Compensation Program (NVICP). The program was created as part of the National Childhood Vaccine Injury Act of 1986 as a no-fault alternative to civil torts for resolving claims of rare but serious vaccine injury. Without evidence, he claimed the NVICP "has devolved into a morass of inefficiency, favoritism, and outright corruption."

Civil torts alleging manufacturer negligence can be expensive to defend even when scientific evidence doesn't support a plaintiff's claim of vaccine harm. In the 1980s, a flood of such cases led companies to cease vaccine manufacturing and threatened vaccine availability. NVICP has ensured vaccine availability.

The NVICP is funded by an excise tax of seventy-five cents per vaccine dose that goes into a trust that covers compensation for various injury-related expenses and administrative costs. Without requiring legal representation, people who believe they were injured by a vaccine can file a petition with the U.S. Court of Federal Claims. The petition is reviewed by HHS and the Department of Justice. A report is presented to a court-appointed Special Master who determines the amount and type of compensation. The Court orders HHS to award compensation accordingly.

In a series of cases in 2009, Special Masters concluded that no credible evidence exists that MMR or thimerosal-containing vaccines cause autism. Thus, autism is not a vaccine injury for which compensation is available through the NVICP.

Bloomberg reported on September 25 that a legal adviser to Kennedy is looking into changing that. Such a change would overwhelm the NVICP, threaten its financial stability, spread more unwarranted fear of childhood vaccines, and increase infectious disease risks for children. For Kennedy, it would be mission accomplished. ■

References

Frieden, Thomas, William Schaffner, and Joshua M. Sharfstein. 2025. CDC's failure to recommend COVID-19 vaccination—"shared clinical decision-making" is abdication of responsibility. *JAMA* (November 13). Online at https://pubmed.ncbi.nlm.nih.gov/41231668/.

Santhanam, Laura. 2025. How RFK Jr.'s hand-picked CDC advisory panel voted on COVID vaccines and more. PBS News (September 19). Online at https://www.pbs.org/newshour/health/how-rfk-jr-s-hand-picked-cdc-advisory-panel-voted-on-covid-vaccines-and-more.

Van Beusekom, Mary. 2025. Quality of decisions made by CDC vaccine advisers has nosedived, former voting members say. CIDRAP (October 24). Online at https://www.cidrap.umn.edu/adult-non-flu-vaccines/quality-decisions-made-cdc-vaccine-advisers-has-nosedived-former-voting.

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NOTES ON A STRANGE WORLD

MASSIMO POLIDORO

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Organizing Doubt: Before CSICOP Had a Name

Editor's note: This is the second in a series of columns from Massimo Polidoro as he recounts stories from the history of the modern skeptical movement and the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP).

Before CSICOP had a name, a mission, or a public face, it already had a problem.

The idea of forming a nonprofit skeptical organization was born in the summer of 1973, as we have seen in my previous column, when James Randi began sharing his thoughts with Martin Gardner and Ray Hyman about the urgent need for a coordinated response to the growing wave of paranormal claims. One early working name for this hypothetical group was SIR: *Sanity in Research.* In a letter to Randi dated August 14, 1973, Hyman made it clear that the organization should offer "something POSITIVE rather than project an image of being a debunking organization."

At the same time, Hyman was acutely aware of a potential problem. A group prominently associated with Randi, Gardner, and him, he warned, risked being immediately labeled as belonging to "the hard-headed, skeptical extremist wing. This is a defect, I feel, and one that we should try to overcome. If we want to reach individuals who are not already confirmed skeptics, then we have to avoid coming on as radical debunkers."

From an Idea to a Shape

The challenge, then, was strategic as much as philosophical: how to remain intellectually rigorous without alienating the very audience the group hoped to reach. From these exchanges, we already see that if Randi was the bold catalyst and Gardner the intellectual reference point, it was Ray Hyman who consistently played the role of strategic conscience, asking not just what needed to be challenged but how and for whom.

One solution, Hyman suggested, was to clarify that the group's purpose "is not to debunk the supernatural nor to prove that extra-sensory is impossible. Rather our goal is to help individuals and organizations evaluate evidence." How?

In an audio cassette recording from the period, Randi proposed that SIR might offer advice to groups already conducting research on ESP. He reasoned that "any serious organization could hardly refuse to accept such help." Hyman, however, was unconvinced:

> I am afraid that this might be somewhat unrealistic. Scientific laboratories are notoriously touchy about safeguarding their independence and protecting themselves from interference by outsiders, including sponsoring agencies. They also can be quite sensitive to any suggestion that they may lack certain expertise in scientific judgment or may require monitoring of some sort by an outside agency. It would take tact and diplomacy of a miraculous sort to convince most ESP researchers to accept our advice.

History would soon prove him right.

Hyman instead pointed to a different—and potentially far more effective—approach: The group could focus on sharing "tools and precautions that are frequently overlooked by people who encounter psychics or seemingly supernatural happenings." Psychology, he noted, had revealed countless quirks of perception, memory, reasoning, and emotion that routinely mislead people when they try to make sense of bizarre events. This knowledge, Hyman believed, could and should reach a much wider audience, especially young people.

He had recently tested this idea firsthand, after giving a talk on mentalism and the supernatural to a fifth-grade class. He performed a few magic tricks, then explained how easily the human mind could be fooled. Hyman wrote:

> We had a fantastic discussion. They asked me questions of a much more searching nature than I get from my college students. The teacher finally had to break off the interaction, after two hours, because recess had come. He said that he had never encountered a previous topic that held the class's interest for such a long period of time. What struck me was how easy it is to convey a few principles to children at this age which might be sufficient to protect them from a variety of things that ordinarily deceive adults.

It was a powerful insight, one that still resonates today. "If an organization such as SIR could prepare kits of materials for grade schoolteachers," observed Hyman, "this could go a long way towards inculcating safeguards before the children become set in their belief systems."

And yet, despite the clarity of the vision, momentum stalled. Months passed. Letters were exchanged. Ideas were refined.

But nothing, for the moment, actually happened.

Big Ideas, Small Steps

"I have not thought much more about Randi's idea for the SIR foundation," Hyman wrote to Gardner in a letter

Stanford 1984 CSICOP Conference. Left to right are Leon Jaroff, Paul Kurtz, and Philip Klass. Credit: Freethoughtlibrarian | Wikipedia.

dated November 2, 1973. Ironically, while the group was united in its skepticism toward extraordinary claims, it proved far less certain about how to organize itself in ordinary, practical terms.

And yet, despite that apparent hesitation, the idea stubbornly refused to fade. Just a couple weeks later, Hyman reported to Gardner about a lunch he had with Leon Jaroff, science editor of *Time* magazine. "If you get to the area in December or January," Hyman wrote, "he is anxious to meet you, and he, too, is talking about setting up some sort of organization to provide information on psychic matters. If and when you know you will be in NYC, let me arrange, for lunch with Jaroff, possibly Randi also (at same lunch)."

By early December, Hyman's interest had clearly reasserted itself. On December 4, he wrote directly to Randi, reaffirming his desire to create a skeptical group—though with an important caveat. Randi's original vision included overseeing parapsychological experiments in laboratories, as well as actively exposing figures such as Geller, Ted Serios, and others. Hyman, however, proposed a different emphasis.

"I think I would be more interested in making the organization one that focused on disseminating the other side of the story on psychic matters," he explained. "This could be done through supplying information kits, video and audio tapes, booklets, bibliographies, and books. We could also provide local schools, colleges, and other groups lectures and/or demonstrators. We could commission films, books, and the like."

He elaborated further in another letter written the same day to Gardner: "Our goal would be to let individuals and organizations know there is another side to the stories the media keeps telling them about UFO's, Uri Geller, psychic surgery, astrological forecasts, and the like."

A crucial question soon emerged: How could such an ambitious project be funded?

"Hopefully," Hyman wrote, "some publishers, foundations, and other concerned citizenry might help to finance the operation by gifts, grants and subscriptions. It might be that the foundation would also obtain some income through commissions on lecture fees, royalties on published materials, etc." Hyman argued that independence depended on sustainability: "If the organization became self-supporting, it would help maintain its independence. Probably it would be best to begin on a modest basis at first. The organization might need a full-time director and some clerical staff at the outset."

New Allies, Old Ambiguities

While these discussions were unfolding, Randi was actively reaching out to

Ray Hyman speaking at a CSICOP event circa 1980s.

other potential allies. Among them was sociologist Marcello Truzzi, from the Ypsilanti campus of Eastern Michigan University.

"Truzzi," Randi later told me, "had come from a famous Italian circus family, was knowledgeable about juggling, conjuring, and such arts. He quite frankly told me that he was 'not a believer in the paranormal' and in the beginning he seemed a very good ally for our cause. I would have soon found out how wrong I was."

For some reason, Truzzi thought that the group in formation was going to be a "consulting firm" and said so to Hyman. "I told Marcello that I think what we had in mind was more in the line of a nonprofit foundation rather than a consulting firm." Hyman then wrote back to Randi in a letter dated December 12, 1973: "I also told him that it was still in the dream stage."

The dream, however, was slowly taking on substance, though it would take time.

After nearly a year of letters and phone calls with Randi and Gardner, Hyman finally traveled from Oregon to New York in March 1974. On Tuesday, March 18, Gardner, Jaroff, and several others met for lunch at the René Pujol restaurant. Randi could not attend. The following day, Gardner, Randi, photographer and magician Charles Reynolds, journalist John Wilhelm (he too, like Jaroff, was from *Time*), and Hyman met again, this time at an Italian restaurant: Anlotti's, according to Hyman's notes (neither restaurant exists today).

"During both luncheons," Hyman later told me, "we discussed Uri Geller, other pseudosciences, the nature of a possible skeptical organization, as well as sources for funding. Leon Jaroff informed us that he had ties to industrialists who might contribute." That Friday, March 23, 1974, Randi and Hyman took the train from Grand Central Station to Hastings-on-the-Hudson, where Gardner lived. "We spent the day at Martin's discussing and planning for our skeptical organization."

What's in a Name?

Hyman, a meticulous note-taker, soon attempted to organize the ideas that had emerged. On April 12, 1974, he outlined several priorities. Before mission statements or objectives, however, one issue stood out above all others: "We need a name." SIR—originally conceived as a playful counterpoint to the Stanford Research Institute (SRI), then involved in research on Geller—was no longer convincing. It was a small problem on the surface but one that revealed how difficult it was to give a clear public identity to an enterprise that was still finding its own shape.

"The name we choose is extremely important," Hyman wrote. "I would like something short, descriptive and distinctive. But so far I have been unable to come close to anything that is acceptable. It is difficult, if not impossible, to come up with a short name that conveys what we have in mind. One thought is to name it after an individual such as the Joseph Jastrow Society."

That idea, too, was soon abandoned.

Other proposals followed in the months ahead. After an August meeting, Hyman jotted down several possibilities, such as Institute for Constructive Skepticism and The Skeptical Seekers. "I lean towards something that has the flavor of Foundation for Constructive Skepticism or Institute for Responsible Criticism," he wrote in a letter to Gardner and Randi dated September 9, 1974.

Alongside these name debates, a growing list of practical requirements took shape ("We need an entrepreneur to take charge of helping to organize … We need to draft a preliminary prospectus … We need to set targets and objectives…"). And amid these sober considerations, some proposals emerged that were anything but conventional.

One, in particular, stood out: "Train a 'straw man' who will be able to convincingly infiltrate major scientific laboratories and convince the investigators that he is a true psychic. The point would be to demonstrate vividly that scientists are simply not equipped to cope with such deception."

For a group committed to careful reasoning and methodological rigor, the proposal was strikingly theatrical. It would certainly have been spectacular and newsworthy.

But could such an elaborate plan be realized, when even the existence of a skeptical organization was still, in Hyman's words, very much a dream? ■

SKEPTICAL INQUIREE BENJAMIN RADFORD

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The Hidden Harms of Conspiracies

Q: **Skeptics seem to spend a lot of time debunking conspiracies, but for the most part aren't they harmless? Most people I know just share them for a laugh. Lighten up!**

—Karl T.

A: In previous columns, I've tackled the harm in believing in psychics and ghosts, and it was inevitable that this question would come up regarding conspiracy theories. Everyone holds mistaken beliefs; it's just part of being human. We can't fact-check everything we're told. Normally this is fine because most of the information we encounter is truthful, or at least accurate for practical purposes. If we're asking directions and are told our destination is five miles away when in fact it's seven, that's not generally a problem (unless we're very low on gas).

Misinformation is generally only harmful if acted upon; it doesn't matter what we're told if it doesn't influence our decisions or behaviors. Privately held doubts about the safety of vaccines, for example, are harmless as long as they don't result in anyone refusing vaccinations. Belief in Bigfoot harms no one—unless people act on that belief and spend resources searching for the beast (or die in the process; see the May/June 2025 issue). And so on.

Unlike any given generic false belief, however, conspiracies have an inherently dangerous element: an enemy embedded in the narrative. Conspiracies, after all, are grounded in the assumption that hidden cabals are controlling the world. These powerful, shadowy groups—such as Satanists or the Illuminati—are the enemy, and their evil influences are there for all to see (if you just know how to read the signs, recognizing, for example, that what appears to be a tragic school shooting is instead a devious false flag operation).

Conspiracy beliefs are linked to personality characteristics such as low interpersonal trust; acceptance of other unusual or related beliefs; paranoia; feelings of personal, social, and political alienation; and feelings of victimization. This last aspect is especially important; people who feel victimized tend to feel justified in retaliation against their real or perceived enemies. (For more on conspiracies in the context of "enemy" drone reports, see Mick West's column in this issue.)

It is undeniably true, as Karl noted in the original question, that for many people sharing and discussing conspiracies and urban legends, it's harmless social media fun. Not everyone—in fact, arguably, few people—necessarily read or believe all the clickbait misinformation they see or share. But some small percentage does, and in some cases belief in conspiracies can provoke violence.

Jared Loughner, the gunman who killed six people and injured fourteen others, including Rep. Gabrielle Giffords, in a 2011 Tucson shooting, advocated conspiracy theories. Laughner endorsed conspiracy theories about the September 11 attacks, faked NASA programs, and that the New World Order is enslaving citizens through central banking systems. Aaron Alexis, a government contractor who killed a dozen people and injured eight others at the Washington Navy Yard in September 2013, believed he had been harassed through a government mind control program. On Christmas morning 2020, a bomb inside a motor home detonated in downtown Nashville, Tennessee. Inside was Anthony Warner, age sixty-three, who embraced many wild conspiracy theories, including that the world is run by a secret cabal of Reptilians, a race of lizard people. The QAnon "Pizzagate" conspiracies that Alex Jones and others promoted resulted in a man shooting a gun in a pizza shop rumored to have been involved in child sex trafficking. And so on.

Of course, most violent people are not conspiracy theorists, most mentally ill people are not violent, and most conspiracy believers are not violent. Though conspiracy beliefs themselves do not cause violence, they can give a name and form to otherwise generalized rage and helplessness and set the stage for violent actions.

Another facet is that conspiracy theories tend to come in clusters, as the examples above illustrate. If a person believes one or two conspiracies, they are far more likely to not only endorse others but accept new ones as well. This has implications for behavior, because the false beliefs are not compartmentalized; for example, belief in astrology likely would have no effect on the way a doctor treats her patients, but belief in

It is common for conspiracy theorists to question whether the Apollo Moon Landing in the 1960s was real. Some say Stanley Kubrick created the scene on a Hollywood set.

a Big Pharma conspiracy likely would.

Conspiracy theories can easily be used as the stated or implicit basis for making both personal and policy decisions. If you believe that vaccines are part of a secret plot to sterilize certain segments of society, that can have very real consequences for you, your family, and your community. If you are in a position of power and believe that global warming is a hoax and that the world's scientists are part of a conspiracy to perpetuate that myth, that will likely influence your policy decisions.

The real problem is conspiracy belief combined with the will and ability to make decisions for others based on those beliefs. This is one reason the many conspiracist appointments to high-level positions in the Trump administration is particularly concerning. The most obvious example is Robert F. Kennedy Jr.'s ardent promotion of anti-vaccination conspiracy theories, considering he holds the office of the secretary of the Department of Health and Human Services. In that capacity, he has demonstrated his willingness to set official policy based on his beliefs. Donald Trump appointed prominent election fraud conspiracy promoter Gregg Phillips to the Federal Emergency Management Agency's powerful Office of Response and Recovery; in that capacity, Phillips makes recommendations on whether federal disaster declarations and aid are warranted.

The common cognitive bias toward confirmation bias is amplified in conspiracy believers. People who are inherently suspicious of most of what they're told tend to embrace conspiracy theories; they typically cherry-pick their trusted sources; they believe government sources are engaging in perpetual cover-ups unless of course they claim to be whistleblowers that echo their beliefs, in which case they're bravely telling the unvarnished Truth. This can lead to people in positions of power dismissing valid information that could be used to inform policy as misinformation by the "deep state" simply because it doesn't comport with their beliefs and assumptions.

Yes, many conspiracies are harmless. Those aren't the ones skeptics are worried about—and if skeptics come off as humorless debunking wet blankets when you share them, it's in service of encouraging critical thinking about *all* of them. No matter how silly or obviously implausible a given conspiracy theory or meme is to you, it's a statistical likelihood—given the reach of social media platforms—that someone, somewhere will see what you shared and believe it. ■

BEHAVIOR & BELIEF STUART VYSE

Stuart Vyse is a psychologist and author of *Believing in Magic: The Psychology of Superstition*, which won the William James Book Award of the American Psychological Association. He is a fellow of the Committee for Skeptical Inquiry.

A Decade (and a Bit More) of Writing for Skeptical Inquirer

The anniversary slipped by without my noticing it, but recently, while hunting down one of my earlier articles, I was reminded that my first online piece for Skeptical Inquirer, "Happiness, Religion, and the Status Quo," was published on December 4, 2014. So, as of December 2024, I completed a decade writing the "Behavior & Belief" column for SI. As I recall, back in 2014, Barry Karr, then executive director of the Committee for Skeptical Inquiry, noticed that I'd been writing blog posts on superstition and other skeptical topics for *Psychology Today*. He contacted me and said, "If you ever want to write for Skeptical Inquirer, we would be happy to have you," or words to that effect. I didn't have to give it a second thought. I'd subscribed to SI for years and assigned it in my psychology classes, so the chance to write a column for SI was a dream come true. I said, "Yes, please!" and never looked back.

Soon after I began writing online, Kendrick Frazier asked to add some of my articles to the print magazine, making me a columnist for SI both online and in print. I could not have been happier. I'd been a college professor for the bulk of my career and found teaching very satisfying, but for as long as I can remember, the title I most coveted was "writer." I'd done the usual academic publishing required of a college professor, but my greatest pleasure as a writer has always come from producing interesting material for regular folks—the elusive "general reader." To have been granted an outlet for my work from a publication and an organization I loved was a terrific turn of events.

When I began writing for SI, Barack Obama was in the middle of his second term, and it would be another six months before Donald Trump made his golden escalator ride, declaring his candidacy for president. The iPhone 6 had been released the prior September, but TikTok was still two years away, as was the Brexit vote that would lead to the United Kingdom's departure from the European Union. Closer to home, the merger of the Center for Inquiry with the Richard Dawkins Foundation for Reason & Science was two years away, and Robyn Blumner had not yet taken the reins of the Center for Inquiry from Ronald Lindsay. (Happily, Lindsay has returned to us as editor of *Free Inquiry* magazine.)

Once I was a columnist, I began attending CSICon on a regular basis and rubbed shoulders with many of my skeptical heroes. I gained many new friends, whom I will always treasure, but in the years since I have been writing for SI, the skeptical community has also lost a number of leaders, including James Randi, Scott O. Lilienfeld, Tom Flynn, Harriet Hall, Kendrick Frazier, and most recently Joe Nickell. These were towering figures in our field, and each of these losses was a substantial blow to the organization and the cause of science and reason. In addition, my beloved first editor and executive director of the Committee for Skeptical Inquiry, Barry Karr, somehow managed to slip away into a well-deserved retirement. (Who approved that?!)

As difficult as it has been to lose these titans, I am greatly encouraged by the talented new voices that have joined the ranks of regular writers for the magazine, including health scientist Katie Suleta, immunologist and epidemiologist Andrea Love, exercise scientist Nicholas Tiller, science communicator Melanie Trecek-King, and folklorist Daniel Reed. The most important addition to the fold has been the new editor of SI, psychologist Stephen Hupp, who recently added executive director of the Committee for Skeptical Inquiry to his growing list of titles. If I ever worried that the skeptical movement would die out with the older generation, I don't have that worry now. We have a group of smart, energetic, and dedicated young people coming up through the ranks at a time when we desperately need them. The world is awash with lies, bullshit, irrational beliefs, and medical pseudoscience, and we need all the help we can get.

Psychology has always been a relatively rational field. This is particularly true for my area of experimental psychology or what is now more often called behavioral or psychological science. There is a famous story about psychologist B.F. Skinner that exemplifies this point. According to legend, he had traveled with his fiancée, Yvonne (Eve) Blue, to meet her family for the first time, and it was decided that they need not wait any longer and should have the wedding on the spot while Eve's family was present. A minister was summoned, and at some point before the ceremony, he took Skinner aside and said, "I hear you are a psychologist. Would you mind if I mentioned God in the ceremony?" Although today there is a strong movement toward more evidence-based methods in clinical psychology—the applied field devoted to helping people with emotional and behavioral prob-

Happiness, Religion, and the Status Quo
By Stuart Vyse
"It is no defense of superstition and pseudoscience to say that it brings solace and comfort to people." ~ Isaac Asimov
This famous quote from Isaac Asimov makes good sense to many of us. Many

lems—science-based methods have not always been popular. But behavioral scientists—like most scientists—are generally quite rational, which explains why there are so many of them in the skeptical community, perhaps second only to magicians.

In my case, it has been a great pleasure to write about psychology in SI. Over the past decade, one of my standard topic areas has been reporting about new research on the psychology of superstition and irrational beliefs. For example, a recent column discussed a new study of the gambler's fallacy (Vyse 2025). I have also written regularly about the disturbing resurgence of pseudoscience in autism treatment. My fifth column for SI, "Facilitated Communication: The Fad That Will Not Die," was published in May 2015, and because—far from dying out—this thoroughly debunked method and its variants have become even more popular with parents of nonspeaking autistic children, I have been writing about facilitated communication ever since. One of the highlights of my career so far has been the opportunity to break the tragic and disturbing story of Kevin Plantan, who was falsely imprisoned for ten months based on charges made through facilitated communication (Vyse 2024b).

But one of the most rewarding aspects of my career at SI has been the willingness of my editors to indulge my diverse whims. Once, when I suffered a Jones fracture in my foot, I wrote a long love letter to the inventors of crutches (Vyse 2019). (I am proud to report that the "Crutch" Wikipedia page now cites my article as a source.) I've written two skeptical travel guides to Paris (Vyse 2021a, 2023) and one of London (Vyse 2024c) and covered the skeptical and psychological aspects of abstract art (Vyse 2021c) and French movies (Vyse 2021b, 2024a). If you are reading this rather self-indulgent article now, it is because my kind editors have spoiled me once again. What more could a writer want?

Finally, speaking of editors, I've had the best. Over the past decade, I've had the honor of being edited by Barry Karr, Kendrick Frazier, Ben Radford, Nicole Scott, Julia Lavarnway, and Stephen Hupp. All have saved me from great embarrassment on multiple occasions, but, among these, SI Managing Editor Julia Lavarnway deserves particular thanks. She has read and edited almost every word I've ever written for SI with great professionalism, efficiency, and care. Thank you, Julia, and thank you all. The relationship between writer and editor can sometimes be fraught, but I have been quite lucky. The Center for Inquiry team is knowledgeable and dedicated. They believe in the cause and work hard to make SI what it has been for half a century: the world's foremost magazine of science and reason.

As for me, dear reader, this is not a resignation letter. As long as the bosses will have me, I will keep writing the "Behavior & Belief" column. I'm already several columns into my second decade, and I can't wait to see what the future will bring. ■

References

Vyse, Stuart. 2014. Happiness, religion, and the status quo. Skeptical Inquirer (December 4). Online at https://skepticalinquirer.org/exclusive/happiness-religion-and-the-status-quo/.

———. 2015. Facilitated communication: The fad that will not die. Skeptical Inquirer (May 11). Online at https://skepticalinquirer.org/exclusive/facilitated-communication-the-fad-that-will-not-die/.

———. 2019. In praise of the crutch-makers. Skeptical Inquirer (May 8). Online at https://skepticalinquirer.org/exclusive/in-praise-of-the-crutch-makers/.

———. 2021a. French science & pseudoscience: A skeptic's tour of Paris. Skeptical Inquirer (August 4). Online at https://skepticalinquirer.org/exclusive/french-science-pseudoscience-a-skeptics-tour-of-paris/.

———. 2021b. The psychology of scary faces. Skeptical Inquirer (November 24). Online at https://skepticalinquirer.org/exclusive/the-psychology-of-scary-faces/.

———. 2021c. Spiritualism and the birth of abstract art. Skeptical Inquirer (December 15). Online at https://skepticalinquirer.org/exclusive/spiritualism-and-the-birth-of-abstract-art/.

———. 2023. Rhinos and radium: A skeptic's tour of Paris, part II. Skeptical Inquirer (December 4).

———. 2024a. Magic at the horizon. Skeptical Inquirer (June 18). Online at https://skepticalinquirer.org/exclusive/magic-at-the-horizon/.

———. 2024b. A life shattered by pseudoscience. Skeptical Inquirer (August 19). Online at https://skepticalinquirer.org/exclusive/a-life-shattered-by-pseudoscience/.

———. 2024c. Science and pseudoscience in London: A skeptic's tour. Skeptical Inquirer (October 7). Online at https://skepticalinquirer.org/exclusive/science-and-pseudoscience-in-london-a-skeptics-tour/.

———. 2025. A closer look at the gambler's fallacy and the hot hand. Skeptical Inquirer (July 30). Online at https://skepticalinquirer.org/exclusive/a-closer-look-at-the-gamblers-fallacy-and-the-hot-hand/.

THE PRACTICAL SKEPTIC MICK WEST

Mick West is a writer, investigator, and debunker who enjoys looking into the evidence behind conspiracy theories and strange phenomena and then explaining what is actually going on. He runs the Metabunk forum and is the author of the book *Escaping the Rabbit Hole*.

How Skeptics Might Save the World

In late 2025, several European countries took increasingly significant actions in response to what they believed was a wave of unusual drones flying near sensitive infrastructure. Airports were shut down. Local police and the military went on high alert. Politicians and commentators talked about this being part of a "hybrid war" executed by Russia. At its peak, the situation even prompted calls to invoke NATO's Article 5 collective defense mandate.

From the start, other observers and I noted the parallels between these events and a similar situation in New Jersey a year earlier, which I had investigated in depth (see Skeptical Inquirer May/June 2025). Back then, there were numerous official claims of drone sightings. Yet every time actual data were provided, those sightings turned out to be misidentifications.

The New Jersey events amounted to little more than a media frenzy and some embarrassing learning experiences for law enforcement, the military, and airport authorities. The European events had, and continue to have, the potential to be far more significant. Here, the role of scientific skepticism becomes much more important, perhaps vitally so.

The Geopolitical Background

Unlike the mainland United States, Europe contains active war zones where drones are a real threat. Russian drone attacks have killed and injured thousands of civilians (OHCHR 2025). These were nothing like the speculative sightings but very real, undeniable drone attacks. Obviously, nobody is doubting the reality of drone incursions in Ukraine.

This reality spreads to the parts of Europe bordering Ukraine. In September 2025, part of a wave of Russian attack drones ended up in Poland, seemingly by accident. The Poles responded with interceptor missiles. The resultant aerial conflict scattered debris in villages and damaged buildings (Reuters 2025a).

It is then reasonably expected that reports of drones would be taken very seriously in those regions and that concern would spread to adjacent countries.

Drone Concern Spreads

Denmark is about 600 miles from Ukraine, less than the distance between New Jersey and Chicago. They are also on a very busy marine passage between the Baltic Sea and the North Sea. The Russian "ghost fleet" of suspected covert military and spy vessels often sails along that passage.

Things began on the night of September 22, just a few days after the Poland drone incident, when Copenhagen Airport received reports of several "large drones" spotted near the airport. The airport suspended operations for four hours. Many flights were diverted, delayed, or canceled. A day later, Oslo Airport, across the sea passage in Norway, also briefly shut down, leading some to speculate on a coordinated Russian attack (Reuters 2025b).

Things escalated rapidly over the next forty-eight hours. Hundreds of drone reports were logged from law enforcement, pilots, airport staff, and members of the public. More airports were shut down, leading to massive disruption in air travel. Denmark's interagency crisis command center, NOST, was elevated to its highest alert—normally reserved for terrorist attacks.

Danish Prime Minister Mette Frederiksen was quick to point a finger at Russia: "I hope that everybody recognizes now that there is a hybrid war, and one day it's Poland, the other day it's Denmark, and next week it will probably be somewhere else that we see sabotage or … drones flying. … I think we are in the most difficult and dangerous situation since the Second World War" (Rankin 2025).

Show Me the Drones

With all the drone sightings and airspace shutdowns, a pattern emerged. First, the sightings were all at night. People did not seem to report seeing drones directly but rather small clusters of lights they *assumed* were drones.

Almost all the cases that led to shutdowns were based only on eyewitnesses. Videos were taken of additional drone sightings after the initial reports, but none unambiguously showed a drone. When radar data were reported, they were never released.

Despite the deployment of anti-drone technology, no drones were captured. No drones crashed, and no drones were shot down. Nobody was arrested for flying drones at night.

Skeptics immediately pointed out a plausible explanation: there were few if any drones and most of the reports were ordinary lights in the sky viewed through a lens of fear and caution triggered by recent events in Poland.

This created a feedback loop in which initial reports (and actions such as airport shutdowns) significantly increased fear and caution, leading in turn to more and more reports.

Skeptics knew this could happen be-

cause we'd seen the exact same things happen in New Jersey. The tools we'd developed and the techniques we had learned during that panic would prove invaluable in analyzing this one.

The Copenhagen Situation Recreation

The Copenhagen airport shutdown was announced on X with a simple post from the local police saying, "Copenhagen Airport is currently closed for takeoff and landing, as 2–3 large drones have been seen flying in the area."

No details were given, but soon a video emerged of a suspected drone taken by a pilot from inside his taxiing plane. It shows what looks like the flashing lights of a small aircraft moving over the runway at a relatively low altitude.

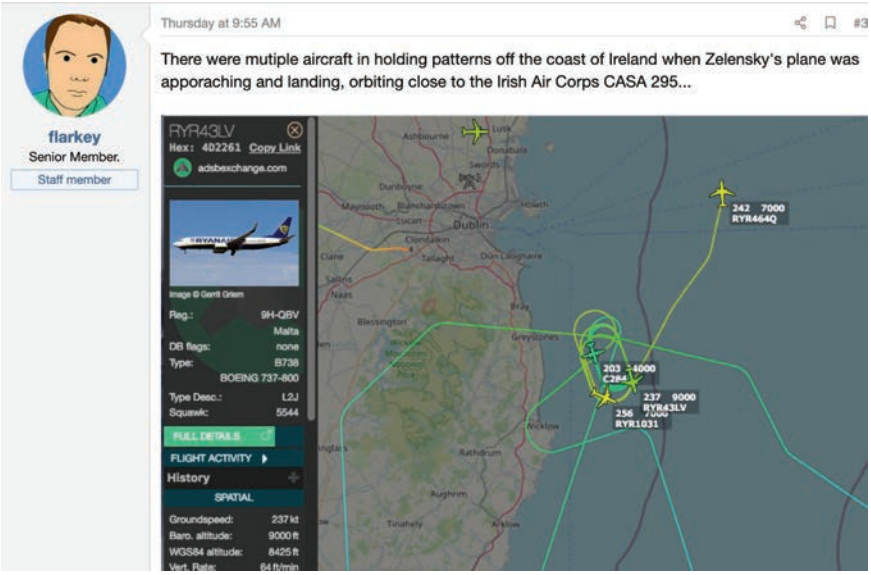
Most of the time, incorrect drone sightings are misjudged as distant planes, but this one seemed different. Was this the fabled "plane-sized drone" that had been causing havoc? Obviously, a small plane would not be doing laps over an active runway. Or would it? Members of my Metabunk forum's "Skydentify" section got to work (Ferriter 2025).

In my last drone article, I noted the importance of accurate DTLs: date, time, and location. We didn't have these exactly but close enough that we could start to eliminate possibilities. It only took a few minutes for forum moderator Trailblazer to find a small plane, tail number OY-CDT, that actually *was* doing laps over the runway.

A bit more detective work narrowed down the time and location, and we were able to import the plane's historical path into the Sitrec software I developed and recreate the pilot's video. It was a perfect match, demonstrating that the video of a "drone" (that had been widely shared by the media) was, once again, just a plane.

Other videos and eyewitness accounts came out, but each time there was sufficient information to tell what they were, they also resolved into planes.

We used the same techniques for identifying planes and then recreating videos repeatedly over the next few weeks as the panic spread across Europe. We were starting so many discussion threads on Metabunk that I had to create a whole new "Drones" sub-forum to collect them all.



A Metabunk post showing planes holding for Zelenskyy's arrival, which might have been mistaken for drones.

On November 6, Gothenburg Landvetter Airport was closed due to a similar "drone" incursion. This time, we had air traffic control audio of the conversation between a pilot and the control tower. The pilot described seeing a drone right in front of him. The recording was timestamped, and we knew which plane it was, so it was a simple matter for Trailblazer to create a recreation "sitch" in Sitrec. He synced up the audio with the replay and found that at the time the pilot reported a "drone" hovering and then moving to the left, there was a distant plane with its landing lights on flying toward him and turning left. This would look exactly like he described—except it wasn't a drone.

Drones Attack Zelenskyy?

A much more significant alleged drone incident happened on December 1, 2025. Volodymyr Zelenskyy, the president of Ukraine, flew into Dublin airport on an official state visit with the Irish government. A few days later, the media reported that drones had been spotted on the flight path of Zelenskyy's plane, raising fears of a Russian assassination attempt.

This is, of course, a possibility that should not be entirely discounted. Russia and Ukraine are at war. Russia would probably want to get rid of Zelenskyy. But motive alone is not great evidence. Were there drones there? The skeptics investigated.

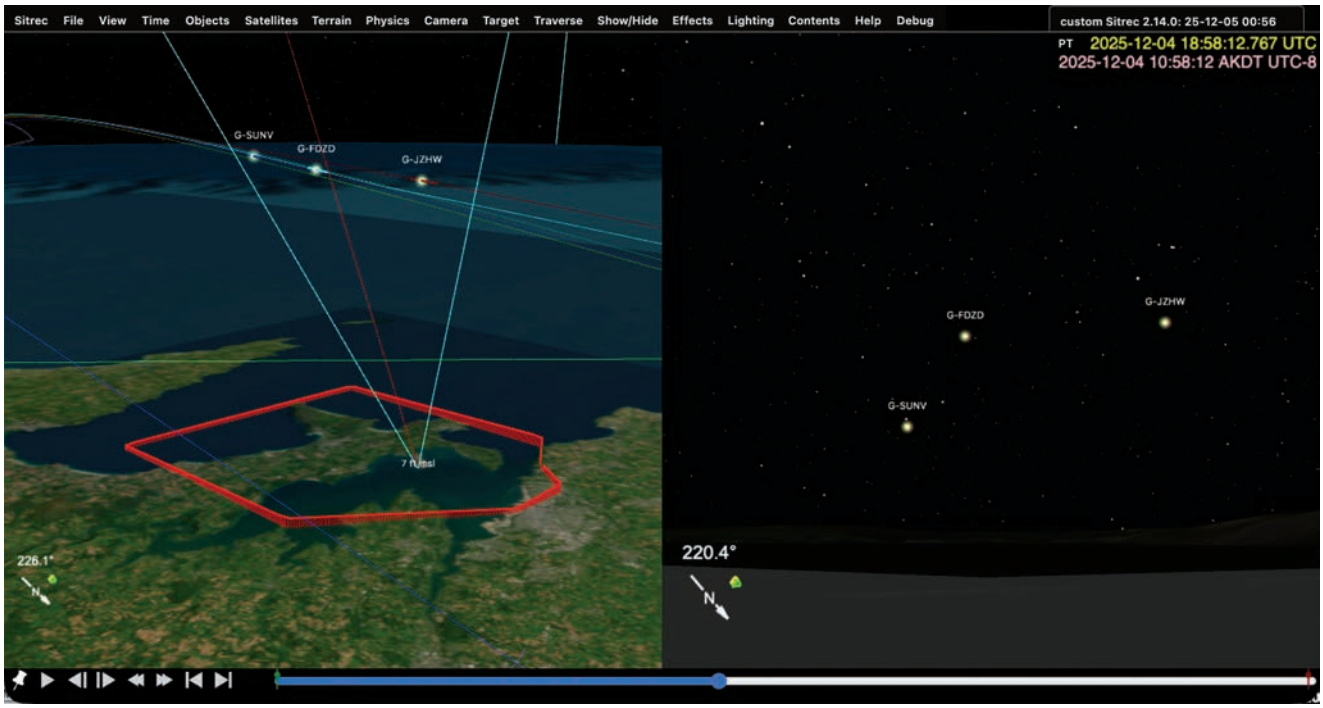
The first thing we noticed was several planes in a holding pattern just off the coast. Recreating this situation in Sitrec, we saw that, again, these distant circling planes could easily be mistaken for hovering drones in the dark.

The next thing of note was the presence of military planes, which obviously were there to provide security, circling the area. Ground observers could also have mistaken these planes for drones. But perhaps more significantly, if there were drones, then these high-tech surveillance planes *should have been able to detect them*. Yet no reports of detected drones have yet been released. It looks like this was all based on fallible eyewitnesses once again.

Drones Shot Down over Nuclear Base?

Île Longue is an incredibly sensitive military site in northwest France. Home to the *Le Triomphant* submarines that carry France's nuclear missiles, it's blurred out on Google Maps, and overflights are prohibited.

On December 5, 2025, it was reported that the police were investigating a drone incursion. Some of the initial stories were unfortunately inaccurate, stating that the French Navy had "shot at" drones. *The Independent* even titled their story "Illegal Drone Shot Down at Nuclear Submarine Base." Again, fin-



Sitrec simulation showing air traffic well outside the no-fly zone visible as lights in the sky.

gers were pointed at Russia.

But a bit more digging revealed a different story. The Rennes prosecutor had opened an investigation into the incident and stated that the military had "fired a jammer and not a firearm"—i.e., they had tried to block the drone's radio signals, not shoot it down. No drones were recovered. No evidence was presented that the drones existed.

The prosecutor went on to say, "[we] must, in particular, identify and interview the individuals who made the initial reports in order to confirm or deny that these were indeed drones." So yet again, the drone report was based only on eyewitness accounts, and the overwhelming evidence from past events suggests that no drones were observed.

While Île Longe is at the center of a small, restricted airspace region, recreating distant flights *outside* that airspace in Sitrec showed they could appear as drones.

The Role of Skeptics

The New Jersey drone panic was a national event. The media and the White House had embarrassing takes on the subject, entirely at odds with the evidence. But it was largely inconsequential beyond being a huge waste of time and resources.

The European incidents are more problematic. They exist in a fraught framework of countries adjacent to, or nearby, a war zone where drones are a deadly fact of life. There's also a very proximate adversary, Russia, that probably is spying on states in the European Union in several ways, including with drones. So, the caution is understandable. You would not want to be the official who failed to shut down the airspace where Russian drones were operating, especially if a foreign leader's life were at stake.

But if we are to detect real threats, we have to separate the signal from the noise. The stakes are high. Endlessly blaming Russia for every imagined drone is not only escalating international tensions but also crying wolf. Do it long enough, and people will ignore you, and a real threat might slip through.

Skeptics, by fact-checking each individual case, help authorities realize that not every light in the sky is a drone, and that a report of someone thinking some lights in the sky are drones is very likely incorrect.

Skeptics should keep those authorities and—as much as possible—the news media grounded in reality, avoiding an international incident unless something can be verified by what we all want: good evidence. ■

References

Ferriter, Kyle. 2025. Copenhagen airport closure due to reported drone activity. Metabunk (September 22). Online at https://www.metabunk.org/threads/copenhagen-airport-closure-due-to-reported-drone-activity.14455/.

OHCHR. 2025. Civilian casualties remain alarmingly high as short- and long-range weapons devastate lives across Ukraine, UN human rights monitors say (September 10). Online at https://ukraine.ohchr.org/en/Civilian-Casualties-Remain-Alarmingly-High-as-Short-and-Long-Range-Weapons-Devastate-Lives-Across-Ukraine-UN-Human-Rights-Monitors-Say.

Rankin, Jennifer. 2025. Europe in "most dangerous situation" since Second World War, Danish PM warns. *The Guardian* (October 1). Online at https://www.theguardian.com/world/2025/oct/01/europe-dangerous-situation-since-second-world-war-russia-war-drones-sabotage.

Reuters. 2025a. Polish missile likely hit house during Russian drone incursion, says minister (September 17). Online at https://www.reuters.com/business/aerospace-defense/polish-missile-likely-hit-house-during-russian-drone-incursion-says-minister-2025-09-17/.

———. 2025b. No link yet between Oslo, Copenhagen drone incidents, Norway says (September 25). Online at https://www.reuters.com/business/aerospace-defense/no-link-yet-between-oslo-copenhagen-drone-incidents-norway-says-2025-09-24/.

POSTCARDS FROM REALITY

ROBYN E. BLUMNER

Robyn E. Blumner is president and CEO of the Center for Inquiry and executive director of the Richard Dawkins Foundation for Reason & Science. She is a lawyer who previously held posts as a syndicated columnist and editorial writer at the *Tampa Bay Times* and as executive director of the ACLU of Florida and ACLU of Utah.

We've All Been Fooled, Right?

I've been trying to remember back to all the nonsense beliefs I once held, even if loosely.

Of course there was religion. I was brought up in a Jewish family and didn't reject the whole business until I was eleven or twelve years old, when I unceremoniously declared that I was an atheist. My parents took it reasonably well and eventually would join me as atheists themselves. At the time, however, it was a lonely identity; I knew no other atheists, and of course there was no way at that tender age in the 1970s to find any others.

But even then, I felt the truth as I saw it was more important than sticking with a god-belief I simply could not wrap my head around as even remotely likely.

During preteen slumber parties, my friends and I would use a Ouija board to ask the universe questions. The planchette (I just looked up that word) would race around the board like it had a mind of its own. It didn't. It was us. We all knew it but pretended not to. It was grand fun.

We would try to levitate one another but would never quite get our "floating" selves above the many fingertips holding us aloft. Still, some would swear that it happened.

I had a really strange exposure to Erhard Seminars Training (EST)—or some similar "mind control" or Zen Buddhism-lite program—at my public middle school. The episode is a vague memory of my entire grade spending multiple days in the school's auditorium being guided by someone who wanted us to get in touch with our inner selves. It was a long time ago, and I don't remember much except there was an uproar from parents, understandably. Apparently, the principal took it upon himself to foist this on the students. We were just happy to be out of our regular classes.

As a kid, I found astrology mildly intriguing. Maybe it was because my Taurus star sign seemed to so well describe my stubborn streak. Maybe it was because the newspaper always had a horoscope column and that gave it the veneer of credibility. Maybe it was the ubiquity of Zodiac charts and astrology tchotchkes alongside the tie-dyed t-shirts, peace buttons, and suede fringed vests in the coolest shops of the times.

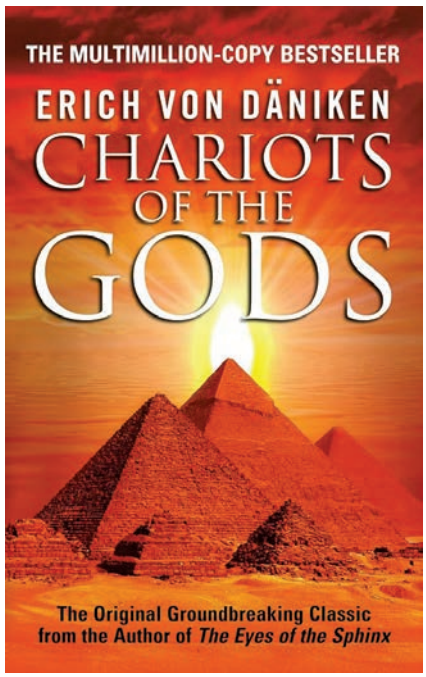
In those days, "What sign are you?" seemed to be the universal ice breaker at parties, until it (thankfully) became hackneyed and mocked.

Yet even as it was an occasional diversion to "check" my horoscope in the newspaper, I never believed the basic premise that the movement of celestial bodies influenced human characteristics or divined the future.

Psychics were ridiculous, always. Who sits in a little room with a red neon "Psychic" sign glowing in the window if they could actually tell the future when the key to immense wealth is simply to buy low and sell high? But even as an adult, I had some very smart friends, women friends exclusively, who consulted psychics. These women were convinced that their psychic was the real deal. I was flummoxed by the gullibility. And when it was reported that Nancy Reagan relied upon astrologer/psychic Joan Quigley to guide her (and to some extent her president husband's) life while in the White House, I started to realize that astrology was not a harmless trifle.

There was one charlatan who got me, though. I bought (literally and figuratively) everything he was selling. Can you guess who it was? It was the purveyor of ancient astronauts, Erich von Däniken. I read his book *Chariots of the Gods* probably at about twelve years old. The evidence that ancient peoples were visited by advanced aliens from space appeared strong to me. I went on to read his subsequent books, convinced that it explained a lot about the art, technology, and religious beliefs of various human civilizations.

Boy, was I wrong. Thank you, Carl Sagan! He and other scientists took on von Däniken's claims, methodi-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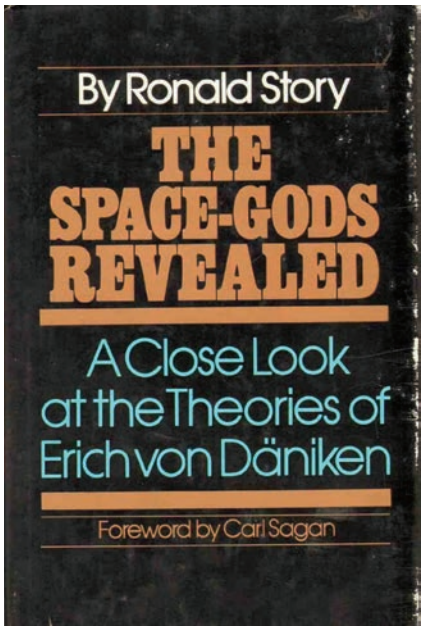

cally documenting their inaccuracies. Von Däniken's thesis, it turns out, was a cornucopia of logical fallacies, cherry-picked facts, and made-up storytelling. He didn't bother to know much about the civilizations he was writing about before attributing some ancient artifact to an astronaut helmet or a giant geoglyph to an alien aircraft landing strip.

That was a lesson in credulity I wouldn't forget.

A book titled *The Space-Gods Revealed*—with a foreword by Sagan—came out in 1976, the same year that the Center for Inquiry's originating organization, the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP), was founded. Just as I was hitting the Age of Reason, the skepticism movement was organizing itself into a fighting force, pushing back on the tsunami of woo nonsense that permeated the culture.

I could not have predicted then, nor could Joan Quigley have done so, that fifty years later I would have the honor to serve as a lieutenant in that army. An army made up of scientists, rationalists, logicians, magicians, technicians, critical thinkers, writers, researchers, activists, and a whole lot of smart, committed people. People who share one thing in common: they value an evidence-based worldview—in other words, the truth. Something that was back then, as it is today, worth fighting for. ■

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THE TIME WARP: SKEPTICISM REVISITED—FROM THE FUTURE

CRAIG A. FOSTER

Craig A. Foster is a CSI fellow and director of research and evaluation at Northshore School District in Bothell, Washington.

Ten Trips, Five Findings, and One Unrelenting Rat

Welcome aboard, friends! On this occasion, we aren't going anywhere. We're using the fiftieth anniversary of Skeptical Inquirer to reflect on the adventures we've had so far.

Imagine what we'd learn about skepticism if we could time travel to 2076. Skeptics, and their critics, could suddenly access the next fifty years of evidence. How warm is the planet? Is creationism still a thing? Did anybody find Bigfoot?

Obviously, there's no known mechanism for traveling to the future, other than waiting, but we can use fifty years of Skeptical Inquirer to play the future observer to skepticism of the past. This type of retrospective analysis provides two advantages over temporally static study. First, it allows us to examine whether historic skepticism was supported across future decades. Where has skepticism succeeded? Where has it failed? What can we learn to make skepticism better? Second, research suggests that increasing psychological distance from a problem can improve critical thinking about that problem (see Kross and Ayduk 2017). Examining skepticism versus credulity from long ago presumably increases that psychological distance.

These advantages inspired "The Time Warp" column. We've taken ten trips so far. Here are five fundamental findings:

1. Skepticism Has Not Changed Since 1976

When the founders published *The Zetetic* in 1976, their stated goal was to address widespread belief in the paranormal. Contemporary skepticism embraces the same fundamental mission. Many of the specific topics that skeptics addressed fifty years ago are still being addressed by skeptics today.

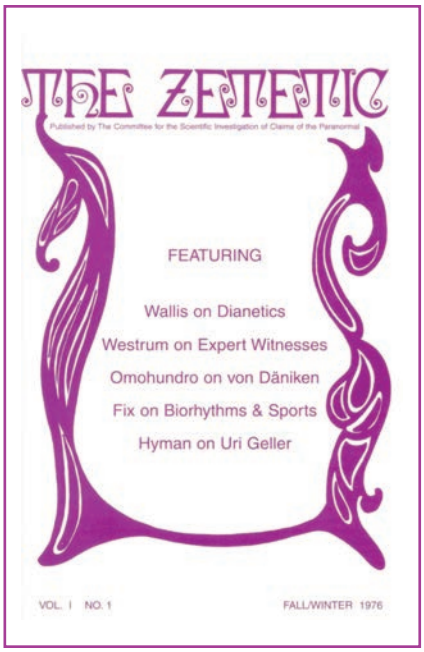
Skepticism's stability occurs because skepticism addresses an ongoing social problem: Communities promote pseudoscientific or pseudohistorical claims using a set of persuasive arguments that do not stand up to more careful examination. These types of promotions are costly, harmful, and sometimes fatal.

That social problem leaves an ongoing niche that skepticism continues to fill.

2. The Argument from Ignorance Is a Big Freakin' Problem

A lot of support for unreasonable claims comes down to the *argument from ignorance*—sometimes called the appeal to ignorance—which involves promoting a claim as true on the basis that the claim has not been proven untrue. The argument from ignorance shifts the burden of proof from claim supporters to claim detractors. The argument from ignorance is misleading because claims are more easily substantiated than they are discredited.

Case in point: Astrology supporters have had centuries to provide a model that works. Every astrological model that has been tested so far has failed; astrology has no sensible physical mechanism. Astrological models nevertheless persist in large part because any model *could* be legitimate, even though there is no reason to believe that any of the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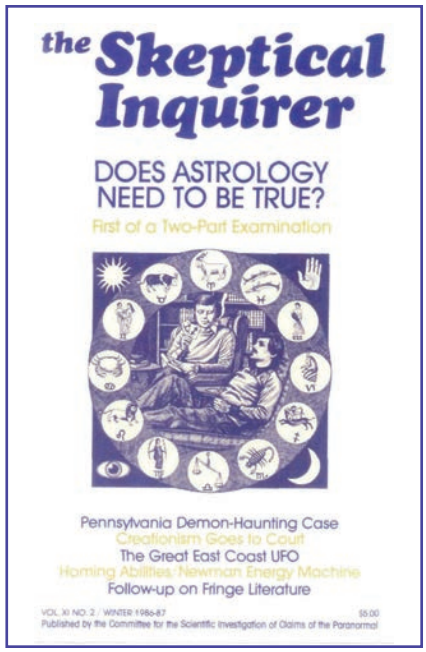
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The Great East Coast UFO
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models *are* legitimate.

The early years of SI demonstrate the magnitude of this basic problem. It's possible to obtain credible evidence for parapsychology, ancient extraterrestrial visitation, contemporary extraterrestrial visitation, dowsing, non-predatory cattle mutilation, and paranormal explanations for the Bermuda triangle if these concepts truly exist.

People still promote these claims without meaningful supportive evidence.

3. Skepticism-Friendly Arguments Frequently Miss Their Mark

Skeptics express a lot of concern about how to argue with people who promote credulity. That concern is often irrelevant, because skeptical inquiry never reaches the people promoting woo. Consider an article from the Winter 1978 (Volume 3, number 2) issue of SI: An ancient aliens theorist claimed that ancient Chinese symbols described a lightning-carrying shape-shifting bird-man-like extraterrestrial visitor who departed in a rocket. David Keightly, a history professor at University of California Berkely, used legitimate historical context to eviscerate this claim.

Keightly's analysis exemplifies the way real historians discredit wild tales about ancient alien visitation. Ancient alien theorists might be persuaded by such historical analyses if they encountered them—which they rarely if ever do.

4. Paranormal Claims Do Not Become Normal Claims

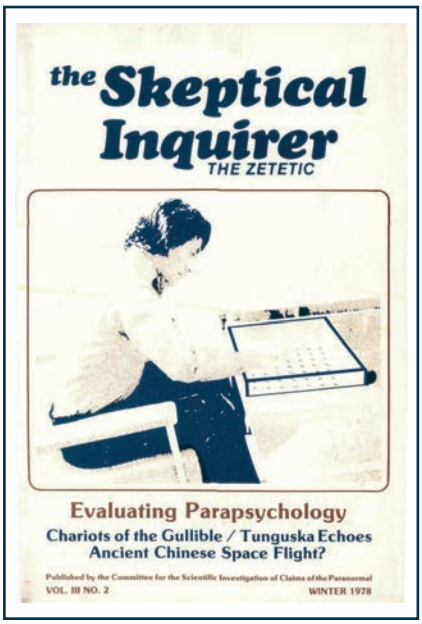
Claims that are broadly criticized by skeptics generally remain unsubstantiated. In fact, I haven't yet found an example of skeptics broadly criticizing a claim only to find themselves clearly on the losing side later.

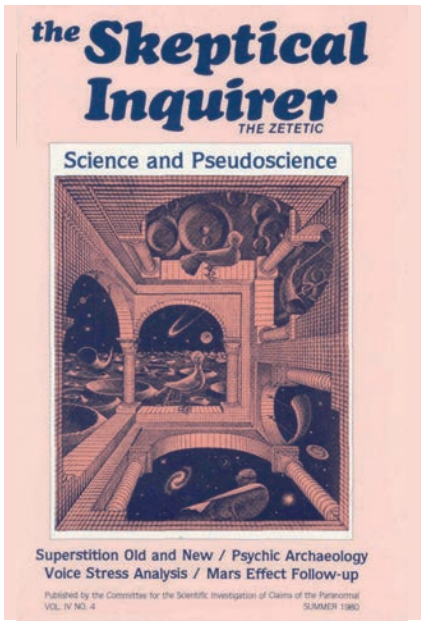
I'm confident I'm not being defensive. Skepticism doesn't need to be correct 100 percent of the time. A big skepticism fail might be good for the skepticism community.

I think skepticism rarely gets embarrassed in this way, because skepticism characteristically addresses popular claims that are so untenable they fall outside of legitimate scientific or historical debate.

Skepticism is sometimes criticized on these grounds—that is, for going after obviously weak claims. That criticism of skepticism is shallow and naive.

Fifty years of SI show that the promotion of costly and harmful pseudoscientific or pseudohistorical claims is its own vexing problem. To my knowledge, nobody, *and I mean nobody*, has identified a robust method for diminishing these types of promotions.

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Voice Stress Analysis / Mars Effect Follow-up

5. Skepticism Is Optimism and Disappointment

Skepticism isn't just an academic enterprise. Skepticism is fueled by a belief that society can save time, money, and lives by becoming more reasonable. Unfortunately, this optimistic approach contributes to enduring dissatisfaction.

Contemporary skeptics probably feel like we live in credulous times. Trips to the early years of SI remind us that being disappointed by the ubiquity of bunk is part of being a skeptic.

The first issue began like this: "This journal, the official organ of the Committee for the Scientific Investigation of Claims of the Paranormal, is intended to communicate scientific information about the many esoteric claims that have shown a growing influence upon the general public, educational curricula, and scientific institutions themselves."

Fifty years of SI likewise document a lot of discontent, frustration, and worry about the influence of ridiculous claims.

I particularly loved an English professor's description of credulity: "You don't have to look for it. You just stand in one place, and it rolls all over you" (Volume 3, number 1, p. 8).

Are people more credulous today than they were fifty years ago? I'm not sure. Considering the prominence of misleading claims today, it sure feels like they are.

But 1976 wasn't a high point for skepticism either. That year provided enough flim-flam to inspire an official committee and journal devoted to addressing paranormal claims.

SI has served in that capacity for fifty years.

Looking Ahead

Looking at the next fifty years, I'm reminded of a saying among psychologists: "The rat is always right."

The phrase means that the rat is going to do what rats do. Hoping that the rat will behave differently isn't going to accomplish anything. The rat's behavior will change when the conditions around the rat change.

Obviously, credulous claims are promoted by people, not rats. Plus, credulous claims aren't even promoted by

a distinct group of credulous people. People are typically skeptical in some domains and credulous in others.

Fifty years of skepticism demonstrate that people have trouble finding our skeptical cheese. If we want society to be more skeptical, then we must do something different.

Personally, I see two major issues.

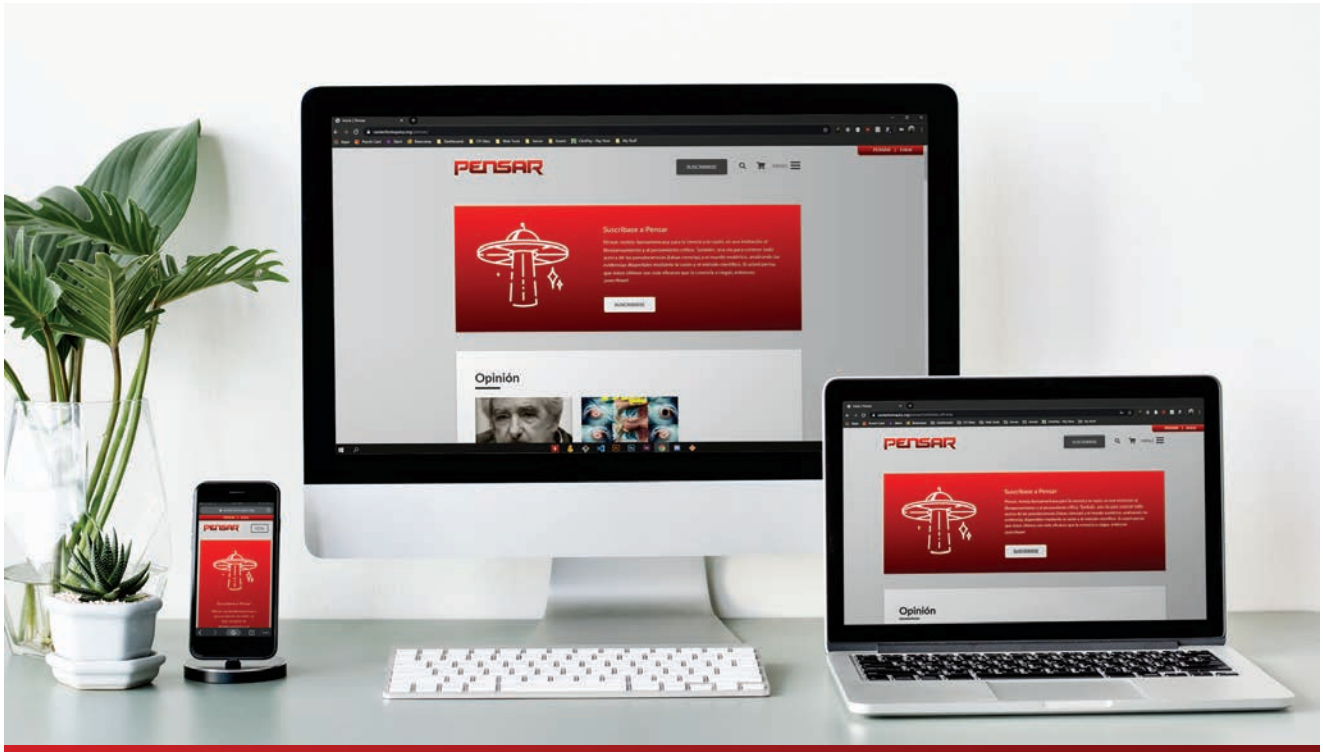
First, we need more people involved in skepticism. Ancient astronaut theorists might not read SI, but they might bump into somebody who does. Those moments where skeptics respectfully offer a different perspective represent a vital component of skepticism. Every skeptic matters.

Second, we need to educate children differently. Primary and secondary educators already focus on ways to improve students' critical thinking. We need to improve those existing practices by methodically teaching students how to (1) maintain healthy levels of intellectual humility, (2) seek different perspectives, and (3) identify and interpret an explicit set of misleading arguments.

Time will tell what the world looks like fifty years from now. From a skeptical perspective, things could be worse, but they could be better too. ■

Reference

Kross, E., and O. Ayduk. 2017. Self-distancing: Theory, research, and current directions. *Advances in Experimental Social Psychology* 55: 81–136.



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INSIDE IMMUNITY ANDREA LOVE

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The Paraben Panic: From Public Outcry to Public Harm

Public opinion driven by fear has immense influence in our society, especially on science and health topics.

A poorly conducted study becomes a clickbait media article that misrepresents the data, the study's flaws, and the real-world implications, and it goes viral when other outlets pick it up. The claims circulate among the public and eventually become cultural belief. When those beliefs are repeated enough, they shape consumer behavior, corporate decisions, and medical practice—even as scientists and skeptics try to correct the record.

The paraben story is a case study in how the irrational fear of chemicals undermines science and public health. What began as public outcry after media outlets amplified a terribly done study vilified a misunderstood and incredibly safe class of preservatives.

Parabens are among the safest, most studied preservatives in modern consumer and medical products, yet ask a random group of people and they'll tell you they're toxic, causing "endocrine disruption" and cancer. They don't.

The science has been consistent for decades, but misinformation is winning the discourse war. The result? Public harm. Not hypothetical dangers but real-world consequences: unfounded fears of safe substances, contaminated consumer products, preventable skin and eye infections, increased allergic reactions, and distrust of scientific experts.

Science Misinformation Spreads Faster

Nearly all anti-science rhetoric follows the same pattern: a weak or poorly interpreted study is mischaracterized by someone without the training to evaluate the data. That distortion is then amplified by media outlets, influencers, celebrities, and/or politicians, and suddenly a fringe claim carries mainstream legitimacy.

Misinformation spreads faster than correction in part because only 28 percent of Americans have civic science literacy—the ability to find, understand, and apply scientific information to decisions about health and policy. That gap exists among our lawmakers too, which helps explain why laws and regulations often diverge from the body of evidence.

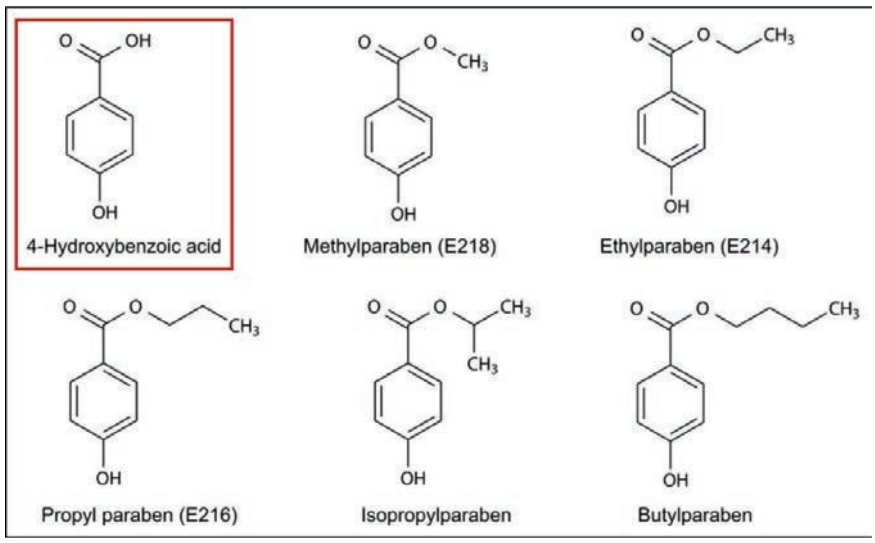
One of the most powerful drivers of science misinformation is chemophobia, which is baked into our cultural narrative and crosses ideological lines. *Chemophobia* is the reflexive fear of "chemicals," especially synthetic ones, regardless of dose, exposure, or evidence of harm. It thrives on the idea that *natural* equals *safe* and *chemical* equals *dangerous*—a belief system that fuels everything from vaccine fear to food panic to the booming "clean beauty" industry (Love 2025).

Fear of parabens is a textbook example of what happens when chemophobia supersedes decades of scientific data.

Parabens Are Incredibly Safe Preservatives

I'm sure you've seen a skincare or beauty product with a label that says "free from parabens" or "no parabens" or something similar, right? And you may have thought: "Wait, do I need to be avoiding parabens?"

The answer is no, but you can thank social media and the misinformation landscape for the mistake. Public outcry, chemophobia, and low science literacy have created a marketplace that



pressures companies to change chemical formulations because of false claims (Love 2025).

Parabens are a class of chemicals that share a naming convention, not identical behavior. They are esters of 4-hydroxybenzoic acid, and just like not all "alcohols" act the same in the body, not all parabens behave the same either.

Parabens, like all preservatives, prevent harmful contamination by inhibiting the growth of bacteria, molds, and yeasts that could harm you. Parabens are very stable, low cost, and work on a broad array of microorganisms. As a result, parabens have been safely used as preservatives since the 1920s in cosmetics, skincare products, and medicines.

However, over the past several decades—and with the rise of social media—the appeal to nature fallacy and the "clean beauty" industry has painted synthetic chemicals, including parabens, as dangerous.

The 'Study' That Sparked the Panic

The paraben panic traces back largely to a deeply flawed 2004 paper in the *Journal of Applied Toxicology*—a study that should never have been published in the first place (Darbre et al. 2004).

The authors analyzed twenty frozen breast tumor samples, searching for trace amounts of parabens. There were no healthy control tissues, no exposure histories, and no dose-response data. No biological mechanism was explored. The problems in the study design were fundamental, which is why this never should have passed peer review:

- **No control group equals no healthy tissue baseline:** You can't imply a cancer link without knowing what's in healthy tissue.
- **No biological relevance**: The authors insinuated a relationship between parabens and cancer formation, yet no biological pathway was studied.
- **Vanishingly small concentrations**: Paraben levels reported were on the order of parts per billion, which, for context, would be equivalent to one second of time in 31.7 years.
- **Contamination concerns:** The blank values (controls run to verify the sensitive instrumentation is operating properly) were often higher than the "measured" sample values.

That's like adding together rubbing alcohol (isopropanol), beer (ethanol), and antifreeze (ethylene glycol), reporting them as "total alcohol," and then declaring that amount of alcohol is dangerous. Yes, they're all technically alcohols—but their effects on the body could not be more different: One can kill you in tiny amounts; one is safe on your skin but dangerous to drink; and one can be consumed in reasonable doses without risk of death.

You can't lump multiple chemicals together and pretend they're the same just because they are in the same broad category. That's basic chemistry—and ignoring that is wrong and reckless.

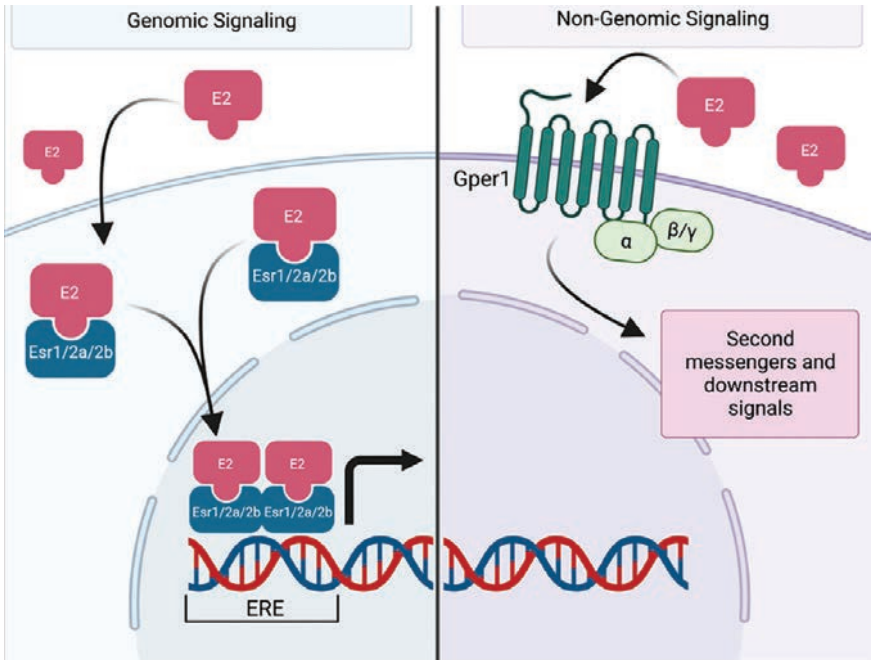
Even if the study was well-conducted, it would have only shown detection, no causal relationship. Yet the authors made unfounded claims that fueled the resulting media headlines: bad chemicals are messing with hormones and causing cancer. Even while no scientific data supported this, public outcry followed those headlines, which fueled more misinformation, policy, product reformulation, and public harm.

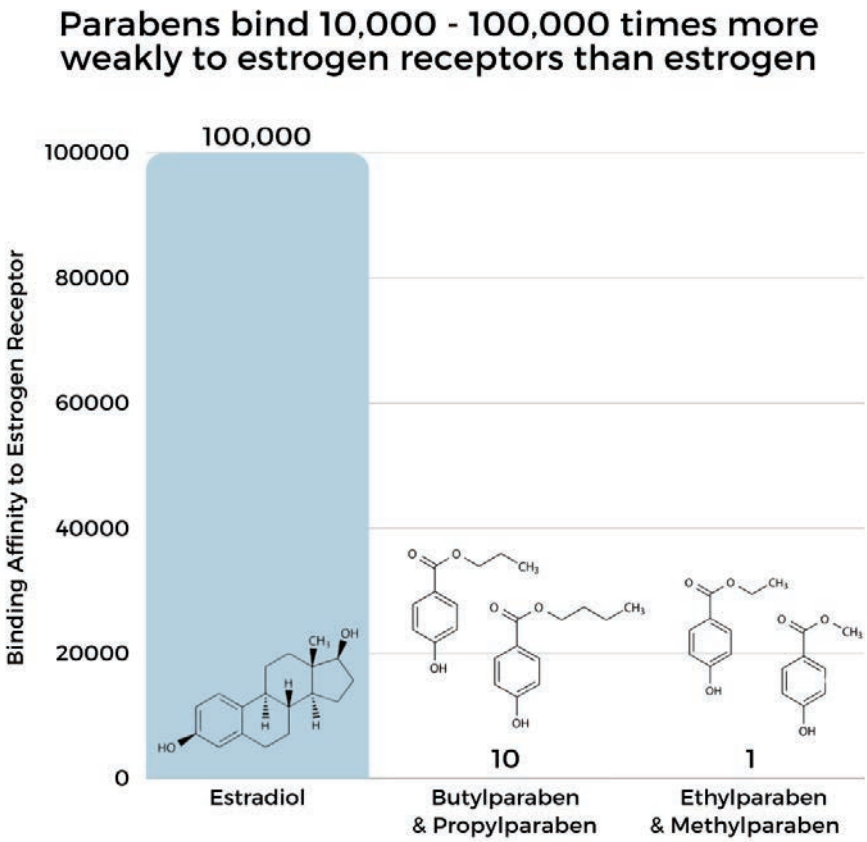
The Estrogen Myth Accelerated Paraben Fears

One claim cemented the fear: that parabens are endocrine disruptors—specifically, that parabens act like estrogen and therefore interfere with normal hormone signaling. That phrase sounds terrifying, which is exactly why it sticks. If you spend enough time online, you might be led to believe that *everything* is an endocrine disruptor—plastics, sunscreens, soy, receipt paper, cleaning products, candles, you name it. Some healthcare professionals buy into this, using this label as if it were a diagnosis, not an unsupported hypothesis.

In the lab, you can make almost any compound look "hormonal" if you drown cells growing on a piece of plastic with enough of it (Okubo et al 2001). Guess what? If you pour pure water on cells in a Petri dish, they explode. That isn't what happens when you drink water. And that means parabens don't necessarily behave the same way in a human body as in a Petri dish either.

In cell biology, these labels don't mean anything. What matters is legitimate biological exposure and effect. To truly be an endocrine disruptor, a substance must not only get into the body in a measurable dose but then must bind hormone receptors strongly enough and at a high enough level to trigger hormone signaling in real tissues in your body, not just in a Petri dish.





Created by Andrea Love for ImmunoLogic.

Butyl- and propylparaben bind 10,000 times more weakly than estradiol, the biologically active version of estrogen. Methyl- and ethylparaben bind 100,000 times more weakly (Golden et al. 2005). The weakness of these interactions mean there is no biological plausibility that parabens are outcompeting your hormones—even more so because your body absorbs only tiny percentages of the parabens you're exposed to and then rapidly excretes them.

Unfortunately, once the phrases "hormone disruptor" and "synthetic chemical" enter public discourse, fear becomes almost impossible to reverse.

Harmless Parabens

More than 300 studies across toxicology, epidemiology, animal models, and clinical research have reached the same conclusion: parabens in consumer and medical products are safe (Cosmetic Ingredient Review Expert Panel 2008).

Parabens are rapidly metabolized and excreted; they do not accumulate in the body. In cosmetics, parabens are typically present at 0.01–0.3 percent. Even assuming high use, only 1–10 percent of that amount is absorbed through the skin—translating to microgram-level exposure, far below any level of concern.

Animal studies reported reproductive effects at ingested doses above 1,000 mg/kg/day—100 times higher than the human acceptable daily intake (ADI) of 10 mg/kg/day—and thousands of times greater than real-world topical exposure. Even extreme, unrealistic cosmetic use doesn't approach doses associated with harm in animal studies.

That's why global safety authorities from the FDA to the WHO to the European SCCS consistently agree: parabens are safe when used as preservatives. But decades of data and expert consensus haven't stopped misinformation. Even now, more than twenty years after that deeply flawed study ignited public fear, headlines continue to undermine science. You can guess what happened.

Outcry Led to Public Harm—Not Public Safety

Public pressure led companies to abandon parabens and reformulate products with alternative preservatives. This wasn't because alternatives are superior but because companies were conceding to their customers' false beliefs. Parabens have broad-spectrum antimicrobial activity, are stable, and are inexpensive.

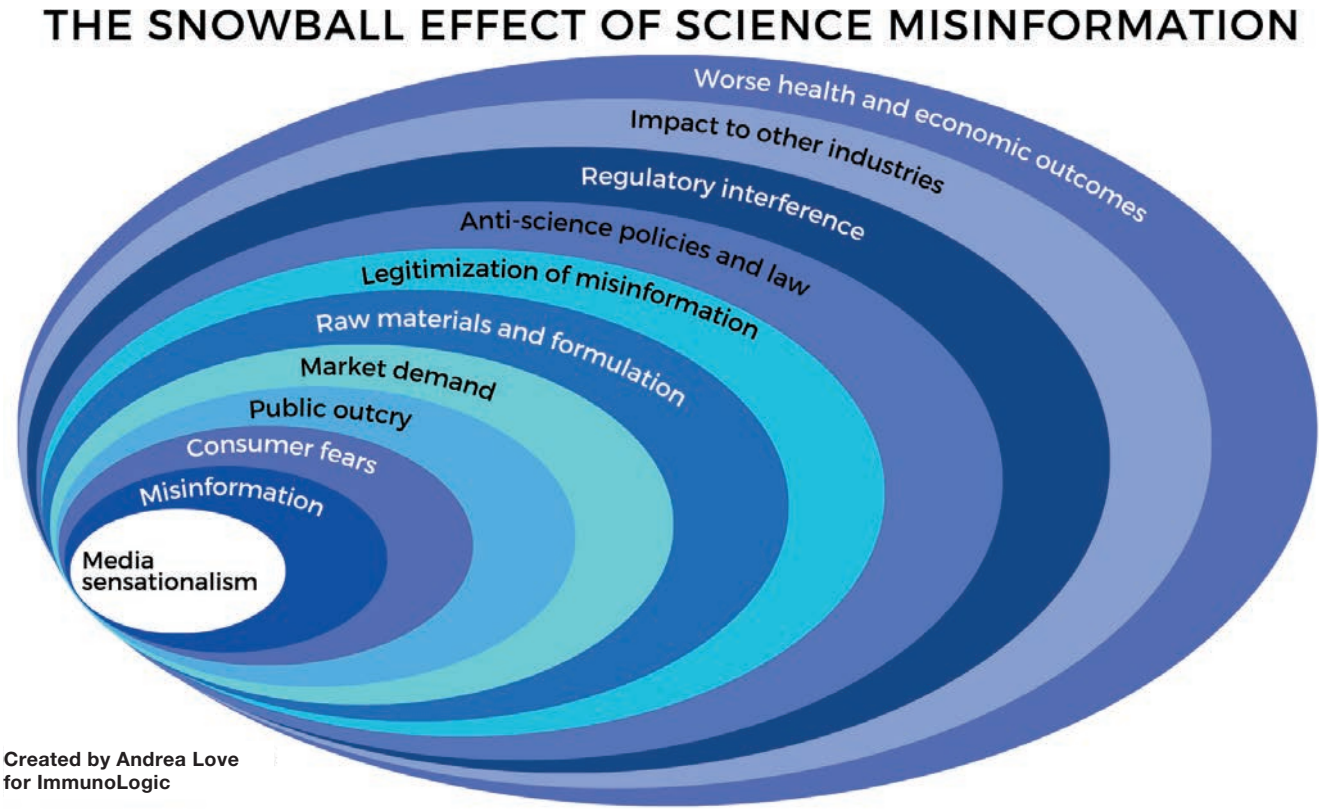
The replacements? Less effective, less stable, and more expensive. For example, many companies shifted to methylisothiazolinone (MIT), a preservative with high allergenic potential (Aerts et al. 2017). As a result, a surge in contact dermatitis and skin allergies has emerged (Reeder et al. 2023; Scherrer et al. 2015; Cahill et al. 2014).

Most dangerously, microbial contamination is present in under-preserved products produced by companies that just opted out of preservatives. Preservatives are used for a reason, but the "clean, chemical-free" beauty industry has swarmed shelves with preservative-free products. Soaps, lotions, baby wipes, powders, and oils marketed as "clean" or "chemical-free" are routinely recalled for contamination with bacteria such as *Pseudomonas*, *Staphylococcus aureus*, and *Burkholderia cepacia*—pathogens that cause serious illness and infections, particularly in infants and immunocompromised people.

Parabens are also used in medical products—antifungal creams, corticosteroids, ophthalmic solutions, injectable medications, and some vaccines. When preservatives are weakened or removed, contamination risks rise.

Aside from the fact that almost every single person uses some skincare or cosmetic products (lotions, face wash, sunscreens, shampoo/conditioner), misinformation forced reformulation in medical products—including antifungal creams, corticosteroids, antibiotic ointments, eye drops, contact lens solutions, and injectable anesthetics.

These medical products have also faced contamination from ineffective preservation. In eye products, that means keratitis and possible blindness (U.S. Food and Drug Administration 2024; Centers for Disease Control and Prevention 2023). In injectables, it means cellulitis, sepsis, and systemic



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infection. Chemophobia doesn't just change labels; it harms society.

The Real Lesson of the Paraben Panic

The paraben panic isn't really about parabens. It's about what happens when fear replaces evidence—when public opinion about "chemicals" overrides a century of toxicology, microbiology, and regulatory science. It's how misinformation—accelerated by headlines, social media, and wellness influencers—reshapes markets, medical practice, and individual beliefs in ways that make us *less safe*, *not more safe*.

The snowball effect of science misinformation is a public health threat.

The paraben case is one example that illustrates the pattern: when falsehoods spread unchecked, they don't just mislead; they change outcomes. "Free from parabens" products are not a win for health and safety. They show how fear beats facts—and how misinformation, once mainstreamed, becomes a driver of real-world harm.

Anti-science rhetoric, clickbait, and legislative policy that ignores evidence don't just confuse people. They produce contaminated products, preventable infections, and unnecessary allergic reactions, eroding trust in expertise. When myths are legitimized, everyone pays the price. ■

References

Aerts, Olivier, An Goossens, Jo Lambert, et al. 2017. Contact allergy caused by isothiazolinone derivatives: An overview of non-cosmetic and unusual cosmetic sources. *European Journal of Dermatology* 27: 115–122. Online at https://doi.org/10.1684/ejd.2016.2951.

Cahill, J.L., R.W. Toholka, and R.L. Nixon. 2014. Methylisothiazolinone in baby wipes: A rising star among causes of contact dermatitis. *Medical Journal of Australia* 200(4): 208. Online at https://doi.org/10.5694/mja13.10946.

Centers for Disease Control and Prevention. 2023. Outbreak of extensively drug-resistant *Pseudomonas aeruginosa* associated with artificial tears. *CDC Health Alert Network (HAN) Advisory 00485* (February 1). Online at https://www.cdc.gov/han/2023/han00485.html.

Cosmetic Ingredient Review Expert Panel. 2008. Final amended report on the safety assessment of methylparaben, ethylparaben, propylparaben, isopropylparaben, butylparaben, isobutylparaben, and benzylparaben as used in cosmetic products. *International Journal of Toxicology* 27(Suppl. 4): 1–82.

Darbre, P.D., A. Aljarrah, W.R. Miller, et al. 2004. Concentrations of parabens in human breast tumours. *Journal of Applied Toxicology* 24(1): 5–13. Online at https://doi.org/10.1002/jat.958.

Golden, Robert, Jay Gandy, and Guenter Vollmer. 2005. A review of the endocrine activity of parabens and implications for potential risks to human health. *Critical Reviews in Toxicology* 35(5): 435–458. Online at https://doi.org/10.1080/10408440490920104.

Love, Andrea. 2025. From food dyes to vaccines: Fear of chemicals endangers us all. Skeptical Inquirer 49(6) (November/December). Online at https://skepticalinquirer.org/2025/10/from-food-dyes-to-vaccines-fear-of-chemicals-endangers-us-all/.

Okubo, T., Y. Yokoyama, K. Kano, et al. 2001. ER-dependent estrogenic activity of parabens assessed by proliferation of human breast cancer MCF-7 cells and expression of ERα and PR. *Food and Chemical Toxicology* 39(12): 1225–1232. Online at https://doi.org/10.1016/S0278-6915(01)00073-4.

Reeder, Margo J., Erin Warshaw, Srikanth Aravamuthan, et al. 2023. Methylisothiazolinone and allergic contact dermatitis. *JAMA Dermatology* 159(3): 267–274. Online at https://doi.org/10.1001/jamadermatol.2022.5991.

Scherrer, M.A., V.B. Rocha, and A.R. Andrade. 2015. Contact dermatitis to methylisothiazolinone. *Anais Brasileiros de Dermatologia* 90(6): 912–914. Online at https://doi.org/10.1590/abd1806-4841.20153992.

U.S. Food and Drug Administration. 2024. Alcon Laboratories issues voluntary nationwide recall of one lot of Systane Lubricant Eye Drops Ultra PF, Single Vials On-the-Go, 25 Count. *Recalls, Market Withdrawals & Safety Alerts* (December 21). Online at https://www.fda.gov/safety/recalls-market-withdrawals-safety-alerts/alcon-laboratories-issues-voluntary-nationwide-recall-one-1-lot-systane-lubricant-eye-drops-ultra-pf.

BIDDLE ME THIS KENNY BIDDLE

Kenny Biddle is the chief investigator for the Committee for Skeptical Inquiry. He examines extraordinary claims, photographic and video anomalies, and "ghost hunting" gadgets to uncover the real-world explanations behind them. He is a CSI fellow, host of the CFI video series *Ghosts in the Machine*, and host of *The Skeptical Help Bar* livestream.

The Uninspired *Conjuring: Last Rites*

On September 5, 2025, the (hopefully) final chapter of *The Conjuring* film franchise, subtitled *Last Rites*, was released in theaters. It was advertised as "Paranormal investigators Ed and Lorraine Warren take on one last terrifying case involving mysterious entities they must confront." According to Amazon's description, the film was "Inspired by the harrowing true story of the Smurl family haunting." But was it really? (Spoiler: No.)

In October 1973, Jack and Janet Smurl, along with their two daughters (Dawn and Heather), moved into a house on Chase Street in West Pittston, Pennsylvania. Almost immediately, during renovations, the family reported strange events occurring: a stain on a new rug that reappeared once, "mysteriously" leaking water pipes, an exploding television set, and "unexplained" scratches on a new bathtub. Despite these strange experiences, the Smurls continued living in the house without blaming ghosts or demons. They even welcomed twin daughters Shannon and Caren to the family in 1978.

Things apparently took a dramatic change on the night of April 29, 1985, when the alleged activity dramatically increased. While the family was preparing to celebrate Heather's Catholic Confirmation, Janet Smurl was in the kitchen attaching a special pin onto Heather's dress collar while little Shannon (age seven) looked on. Suddenly, the three ladies heard a "massive tearing sound," just before the four-foot kitchen light fixture came crashing down. There are three different versions of what happened to Shannon when the light fell:

1. In a recorded interview, Janet claimed Shannon received a gouge on her forehead.

2. In the first published newspaper account, the fixture narrowly missed Shannon altogether (MacMellan 1986).

3. The book *The Haunted* reported that Shannon was struck in the shoulder.

There's no physical evidence of anyone actually sustaining an injury; neither does the experience seem overly concerning, because according to *The Haunted* (the book detailing the alleged true account of the haunting), "the Smurls got their daughters ready to pile into the van and drive to Immaculate Conception Church for confirmation. They were already running seriously behind time" (Curran 1988). So, I guess demonic attacks aren't really a big deal when you're late for an event.

The next day, Janet was in the basement tending to the laundry when she heard a voice calling her name. In an on-camera interview recorded on February 14, 1986, Janet described hearing her name called twice ("Janet, Janet") and thinking it was her sister, so she went upstairs but found nobody in the house. Interestingly, there is a different and much more dramatic (scary-ish) version described in *The Haunted*. Nevertheless, these two experiences, combined with several more incidents, prompted Jack and Janet to seek help. Unfortunately, they made a very poor decision.

Enter the Warrens

In December 1985, the Smurls contacted Ed and Lorraine Warren on the (bad) advice of a friend. The following month, the Warrens visited the Smurl residence for the first time and immediately declared the house infested with spirits—including at least one demon. Never one to decline an interview, Ed Warren spun wild tales of the "horrors" going on inside the house, while simultaneously thwarting any scientific investigation from taking place in the house. He blocked CSI representatives Richard Busch and Milton Rothman, who were invited by Jack Smurl, from entering the house.

Keeping with their usual "investigation" routine, Ed and Lorriane were hardly onsite at the Smurl house, instead sending two separate teams (consisting of their friends and family) to stay at the house and "investigate." Even with approximately seven additional team members, the Warrens continually failed to provide any physical evidence of the alleged supernatural events, offering only personal (and fantastical) anecdotes.

To keep the press frenzy going, Ed Warren announced an exorcism would be performed. This religious rite would not be conducted by the local diocese but instead by an excommunicated priest the Warrens brought in themselves from Connecticut, Robert F. McKenna. In total, the rogue priest performed a total of three exorcisms on the house—not on any particular individual, which is usually the case. None of these antiquated rituals were successful, according to everyone involved.

Nevertheless, the media interest came to an end when Jack and Janet Smurl gave a statement to the press on October 27, 1986, claiming, "for several weeks now all has been quiet in our home and it would appear that our problem has been resolved." They credited the "intercession of the blessed virgin Mary, St. Michael the archangel, and the sacred heart of Jesus" for eliminating their supernatural problems. They conspicuously failed to credit or thank Ed and Lorraine Warren. However, a week later, St. Martin's

Author at the allegedly haunted Smurl House in West Pittston, Pennsylvania.

Press announced a book deal based on the Smurls' story.

The book, *The Haunted: The True Story of One Family's Nightmare*, provided a highly embellished retelling of the experiences inside the house on Chase Street, taking much more than the stated "minor liberties" (mentioned in the beginning of the book) when recreating the timeline of events, scene and experience descriptions, and the dialogue. Robert Curran, the main author, even went so far as to include an entirely fictional character who, as best I can ascertain, was included simply to pad the book with additional pages.

So how much of the film was really inspired by the "harrowing true story of the Smurl family haunting"? None of it. Seriously. Aside from using the Smurl family's names, the film completely abandons the source material and instead tells a fictional story focused squarely on Ed and Lorraine Warren in a glorified subplot of "passing of the torch" to their daughter, Judy, and son-in-law, Tony Spera—neither of whom had anything to do with the Smurl case. The Smurl family members were relegated to something less than secondary characters in the film, barely more engaging than background extras.

The film also provides a new fabricated origin for the alleged "demonic" tormenting of the Smurl family: a mirror. We're now told an antique mirror is the source of all the evil spirits, which the film-version Warrens encounter at the start of the movie and then reappears later on and in the anti-climatic supernatural battle at the end.

The mirror plot was inspired by a real mirror that has been in the Warren's Museum for quite some time. Ed Warren, in an interview conducted by his son-in-law, Tony Spera, relates the story of the mirror: "That's a magic mirror that a gentleman in New Jersey used to conjure up spirits" (Official Ed and Lorraine Warren Channel 2020a; 2020b). Ed goes on to say that the unnamed (of course) man ended up in a mental institution. It has no connection whatsoever to the Smurl family or even the state of Pennsylvania, nor does Ed mention an evil encounter with it years earlier as is portrayed in the film. It's nothing more than a thrift store find with a vague, unverifiable story from Ed Warren (which is pretty much what he did for most of his museum objects).

To be fair, we do see three scenes in the film that are loosely "inspired" by the original source material in varying degrees. First, we do see the kitchen light fixture crash down from the ceiling—but it's while the Smurl family is sitting around the table having dinner, long after the day Heather celebrated her Confirmation. Next, we see a generic, rather forgettable version of Janet Smurl's experience in the basement where she claims to hear her name called. However, in the film, Janet just gets creeped out by a dark corner of the basement and subtle whispers that seem meant more for the audience rather than the character.

Lastly, in the film, the family dog (a Labrador retriever, not the Smurls' actual German shepherd) gets picked up and tossed aside by a possessed Judy Warren as she rampages through the house during the third act. According to *The Haunted*, "Janet was in the kitchen doing dishes, Simon sprawled out by her feet, when suddenly she saw Simon lifted from the floor by invisible hands and smashed against the kitchen door. The dog howled in pain as it crashed to the floor." This is quite different from what is portrayed in the film.

When it comes to the film version versus the documented events and the likely explanations, I'm only giving you an appetizer here. I invite you to check out the *Ghosts in the Machine* video, "Investigation of the Smurl Family Haunting," on the Center for Inquiry's YouTube channel for a deep dive into the claims that separates facts from fantasy.

To watch "Investigation of the Smurl Family Haunting," scan the QR code. ■

CFI's YouTube Channel

References

Curran, Robert. 1988. *The Haunted: The True Story of One Family's Nightmare.* New York, NY: St. Martin's Press.

MacMellan, Minnie. 1986. West Pittston family fights 'supernatural.' *Sunday Independent*, p. 9.

Official Ed and Lorraine Warren Channel. 2020a. EXCLUSIVE: Lorraine Warren interviews Jack and Janet Smurl. Relates horrifying demonic attack. YouTube (September 16). Online at https://www.youtube.com/watch?v=iBTaY-hsRLI&t=621s.

———. 2020b. Exclusive! Ed Warren gives actual tour of the Warren Occult Museum! YouTube (September 26). Online at https://www.youtube.com/watch?v=uaPgA12CPjw&t=4591s.

THE MISSING THINK

MELANIE TRECEK-KING

Melanie Trecek-King is the creator of Thinking Is Power, which empowers individuals with the skills to make better decisions and protect themselves from misinformation. She is a CSI fellow as well as an active writer, speaker, and consultant.

This Isn't about Bigfoot

Like many skeptics, I'm fascinated by things people believe in—ghosts, psychics, astrology, reiki—but I'm even more intrigued by *why* they believe in them. In my experience, everyone believes (or has believed) something that's a little "out there."

So, when my husband and I learned about a nearby Bigfoot museum on a recent road trip, I had to go.

Our GPS led us on quite the adventure through farms and woods and onto increasingly remote gravel roads. We finally found a driveway and discovered the "museum" was in someone's house. After knocking to no avail, I called the number on the window. The woman who answered told us we were the only visitors, but she could let us in shortly.

Jan, a lifelong Bigfoot believer since a childhood sighting, met us with infectious enthusiasm. ("Jan" is a pseudonym to protect her privacy.) She had spent most of her life collecting "evidence," which she had documented both in a book and across four buildings on her property.

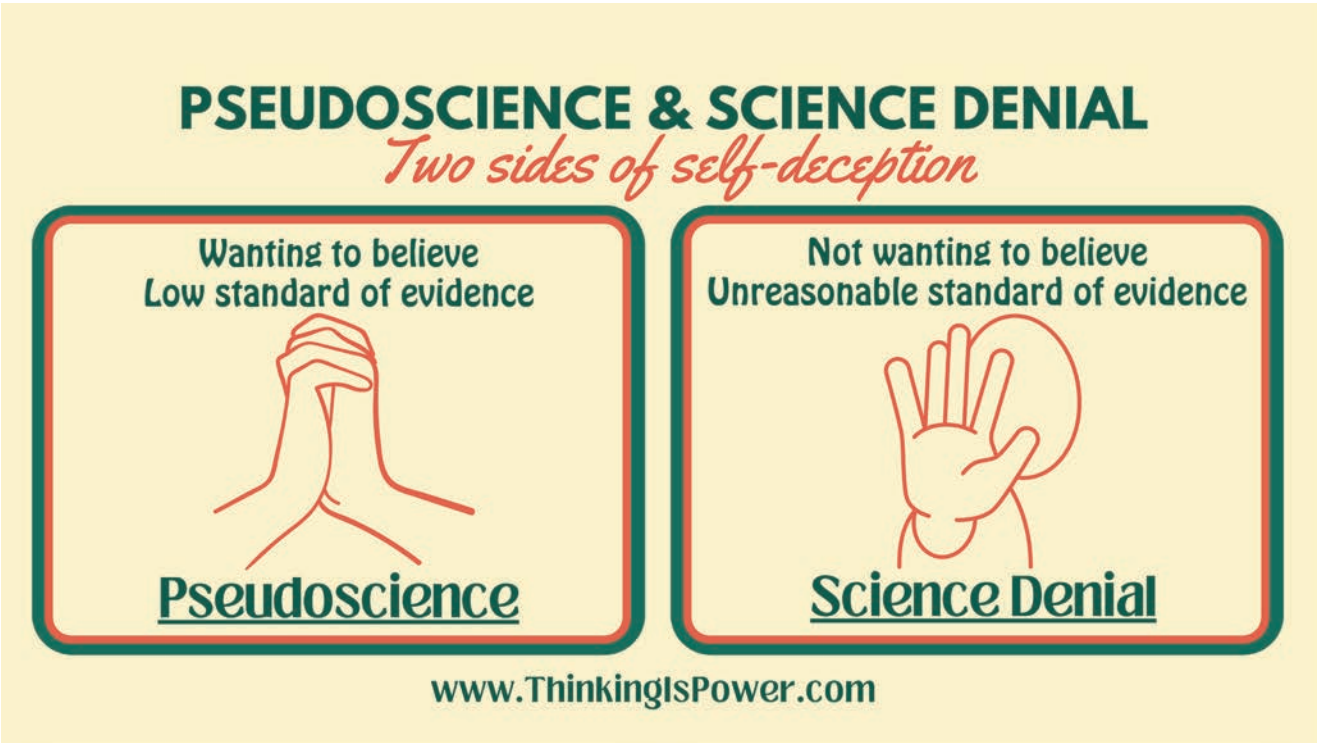
The Evidence

As the local "Bigfoot expert," Jan had compiled numerous firsthand accounts of sightings over the years. She shared the story of a farm kid, known for being responsible and trustworthy, who was late to school one morning. He told his teacher that a large and hairy human-like animal had crossed in front of his car. It had even looked him in the eye. To Jan, these weren't just stories; they were the ultimate proof.

Because of her reputation, Jan said the police would occasionally contact her to help investigate "weird things," such as sightings, large footprints, and unexplained photographs. When I asked to see the police reports, she claimed she couldn't because they included "private information." (I thought this was odd, as police reports in that state are generally considered public records.)

Eventually, Jan moved on to a large wall map covered in red pins. "Can you spot the pattern?" she asked. Most of the pins, which she called "confirmed sightings," were near rivers. To Jan, this proved they were Bigfoot, as Bigfoot likes to be near water.

Next, we were shown photos of tree



The author at a Bigfoot museum

breaks and arches. Jan explained that Bigfoot uses its massive strength to mark its territory or create shelter by snapping trunks or bending saplings.

Jan then left for a moment to retrieve her most recent line of evidence, returning with a clump of braided horsehair. She explained that all over the world, mysterious braids appeared in horses' manes and tails, seemingly overnight. While "skeptics" often dismissed them as tangles caused by wind, Jan was convinced they were the work of skilled hands—Bigfoot's hands.

I asked Jan if there might be other explanations for the evidence. People's perceptions aren't always accurate (or truthful). Wildlife are also found near water, and bears are often mistaken for Bigfoot. Storms can bend or break trees. People can braid horse tails. But Jan was convinced; the only logical explanation was Bigfoot.

After her introduction, Jan sent us off to tour the exhibits. We saw several casts of footprints and a report that Vladimir Putin had spotted a family of Yeti in Siberia on April 1, 2016 ("Vladimir Putin" 2016). (This seems to have been an April Fool's joke.)

As we continued through the museum, an interesting trend emerged: it wasn't just about Bigfoot. One room, for example, had exhibits featuring aliens at Roswell, Mothman, chupacabra, and mer-moose. (Really.)

The next room featured a mock skeleton of a giant, close to nine feet tall, with two sets of teeth and hands as feet. Over the display was a photo of "skeletons"—up to thirty feet tall!—and a sign that read: "In those days and even afterwards, when the evil beings from the spirit world were sexually involved with human women, their children became giants." It was the Nephilim from the Bible, paraphrased from Genesis 6:4. (Is it me, or does the Bible blame women a lot?)

Jan then shared a dramatic story: In the early twentieth century, a nearby river flooded, killing many and exposing the remains of giants! The bones had been sent to the state university's science museum, but when Jan called, the staff claimed ignorance. However, a janitor overheard and asked her to call after hours. He confirmed Jan's suspicions: the skeletons had disappeared to cover up the evidence.

(It was at this point that my husband ditched me to "take a phone call.")

The final room featured Carl Baugh, founder of the Creation Evidence Museum. Baugh is known for "discovering" human and dinosaur footprints along the banks of the Paluxy River in Texas, a claim that's been so thoroughly debunked that many creationist "researchers" have withdrawn support (Cole and Godfrey 1985; Neyman 2008). Next to a replica of the footprints was a photo of Jan on an archeological dig with Baugh.

It turns out that Jan isn't only a Bigfoot enthusiast; she is a young-earth creationist (YEC). To her, Bigfoot is a "kind" of human, created by God with everything else less than 10,000 years ago. Scientists, she said, were either unwilling to accept the truth or covering it up. (As a former YEC, I can relate to Jan—but not about the Bigfoot part.)

Looking Deeper

Until then, the museum had felt steadily weirder and more confusing. But at that moment, the pieces clicked.

Jan clearly thought science is reliable and that her beliefs are evidence-based. (We all do.)

Here's the problem: What do we do when important beliefs clash with scientific findings? We could accept the

evidence and change our mind, *or* we could massage the evidence so that we don't have to change our mind. Jan had clearly chosen the latter option.

The key to this deception is to convince ourselves that *we're* the ones doing the real science. So, we pretend by dressing up our views in sciencey-looking costumes.

Science has two main pretenders, which can be distinguished by their underlying motivation and resulting standard of evidence (Trecek-King 2021):

- **Pseudoscience:** Unsupported, false, or unfalsifiable claims. Belief in pseudoscience is motivated by wanting to believe, so our standard of evidence is very low.
- **Science denial:** The rejection of strongly supported scientific conclusions. It's driven by not wanting to believe, so our standard of evidence is impossibly high.

Importantly, both rely on the same excuse to explain why their positions are at odds with the overwhelming scientific consensus: it's a conspiracy.

Our desire to self-deceive is so strong that we can convince ourselves we're not pretending. But if we take their masks off, we can see them for what they are: motivated searches for evidence to confirm what we want (or don't want) to believe.

Jan's exhibits beautifully displayed the characteristics of pseudoscience and science denial: cherry-picked evidence (e.g., horse braids and photographs), anecdotes (e.g., "sightings"), fake experts (e.g., Carl Baugh), and conspiracy theories (e.g., the stolen giant skeletons and the "lie" of evolution).

Science's pretenders work in concert, raising and lowering our standards of evidence as needed to protect important beliefs, especially those tied to our values, desires, identities, and social groups. Jan's belief in creationism, rooted in her religious faith, required her to deny evolution and distrust mainstream science, which created fertile ground for other pseudoscientific beliefs. In fact, Jan saw Bigfoot as proof of creationism.

The process of science is reliable because it corrects for the ways we fool ourselves. And key to this process is the scientific community, which provides essential checks and balances by collectively scrutinizing and vetting claims (Oreskes 2019). The system incentivizes scientists to find limitations and flaws in each other's work. The result is knowledge that's more reliable and trustworthy than any single person could achieve.

On the other hand, the pretender community dismisses this essential scrutiny as "closed-mindedness" or a conspiracy. Instead, they reward affirmation and agreement, creating a closed loop that protects beliefs from internal conflict and external challenge.

It's Not about Jan, Either

While Jan's beliefs were certainly further on the anti-science spectrum than many, sometimes the extreme cases can be the most illuminating. False beliefs that provide comfort and certainty can slip right past our skepticism. And we're especially vulnerable if we're part of a community organized around beliefs.

We all have reasons for what we believe, and often they run much deeper than we're aware. Jan's Bigfoot belief was tied to many others, all of which likely share a similar foundation. Firehosing reliable information isn't going to work, because it's not about Bigfoot.

If I've learned anything about misinformation, it's that we can all be Jan. Every one of us is vulnerable to false claims that confirm our worldview or push the right emotional buttons. To successfully fight misinformation, it's essential to identify and guard against these underlying motivations.

As I left, I asked if I could purchase a souvenir, but Jan was sold out. When I mentioned I hoped for something to hang on my Christmas tree, she disappeared briefly and returned with a copper Bigfoot footprint attached to a leather tie. Despite my offer to pay, Jan insisted it was a gift, so I discreetly added to her entrance fee jar.

I learned a great deal at my first Bigfoot museum—not about Bigfoot, but about the nature of belief itself. For that, I'm grateful to Jan, a true believer and kind teacher. ■

References

Cole, John R., and Laurie R. Godfrey, eds. 1985. The Paluxy River footprint mystery—solved. *Creation/Evolution* 5(1): 1–46. Online at https://ncse.ngo/files/pub/CEJ/pdfs/CEJ_15.pdf.

Neyman, Greg. 2008. Creation Evidence Museum lacks evidence! *Answers in Creation* (September 5). Online at https://web.archive.org/web/20080905065319/http://answersincreation.org/rebuttal/cem/cem.htm

Oreskes, Naomi. 2019. *Why Trust Science?* Princeton, NJ: Princeton University Press.

Trecek-King, Melanie. 2021. Science and its pretenders: Pseudoscience and science denial. Thinking Is Power (August 18). Online at https://thinkingispower.com/science-and-its-pretenders-pseudoscience-and-science-denial/.

Vladimir Putin "sights a Yeti family" in remote Siberian mountains. 2016. *The Siberian Times* (April 1). Online at https://web.archive.org/web/20240224071200/http://siberiantimes.com/other/others/news/vladimir-putin-sights-a-yeti-family-in-remote-siberian-mountains/.

50 Years of Skeptical Inquirer Columns

BENJAMIN RADFORD

While there have been hundreds of one-off or occasional writers for CSICOP/CSI whose work is important and valued, Skeptical Inquirer columnists have shown a special dedication to skepticism and the organization. They repeatedly contribute unique insight and information, often by deadline.

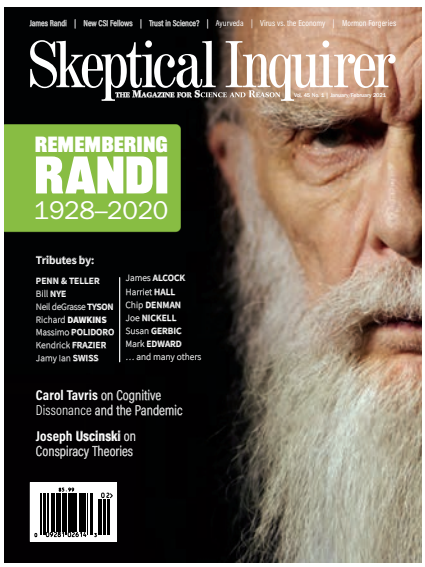
In my capacity as an editor at SI, I've had the privilege of editing and working with some of the best and brightest skeptics in the world. From an editorial standpoint, while articles typically require much more lead time between submission and publication—sometimes a year or more—columns are (usually) shorter, timelier, and often more personal and idiosyncratic. Columnists have a bit more license to pick their own topics and share their stories. This often results in delightful slices of life, from Martin Gardner reminiscing about meeting Ernest Hemingway on a New York sidewalk to Joe Nickell discovering his unknown daughter, from Stuart Vyse's European travelogues to Robyn Blumner's youthful interest in ancient aliens. All these reveal a more personal side of skepticism.

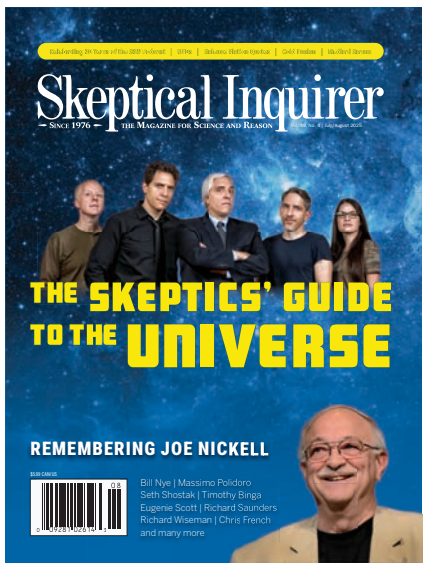
As Craig Foster reveals in his own SI column, The Time Warp, the sheer volume of columns and breadth of topics is amazing. In terms of total number of column entries, prior to this issue of SI, the grand totals are: Joe Nickell (174); Robert Sheaffer (164); Benjamin Radford (126); Massimo Polidoro (114); Martin Gardner (92); Massimo Pigliucci (91); Stuart Vyse (52); Kenneth Krause (31); Ralph Estling (29); Harriett Hall (28); Mick West (26); Matt Nisbet (23); Eugene Emery (15); Robyn Blumner (13); Steven Novella (12); Craig Foster (10); Andrea Love (6); James "The Amazing" Randi (5); Chris Mooney (2); Stephen Barrett (2); and Robert Epstein (1).

There are, of course, many other important columnists associated with CSICOP/CSI, including for the *Skeptical Briefs* newsletter, *Skeptical Inquirer* online, and *Pensar*. But to the extent that SI is the flagship publication of the skeptical organization, the backbone of that ship is the editors and columnists who work issue after issue doing the best they can to produce thoughtful pieces of investigation, commentary, and critical examination of extraordinary claims.

The magazine covers below depict some of our former columnists, and the timeline on the next page represents the start and end dates of each of the print columnists over the first fifty years. ■

Benjamin Radford has been managing—then deputy—editor of Skeptical Inquirer since 1998.




Skeptical Inquirer
THE SKEPTICS' GUIDE TO THE UNIVERSE
REMEMBERING JOE NICKELL
Bill Nye | Massimo Polidoro
Seth Shostak | Timothy Binga
Eugenie Scott | Richard Saunders
Richard Wiseman | Chris French
and many more

Skeptical Inquirer Columnists Timeline

Robert Sheaffer | Psychic Vibrations

Martin Gardner | Notes of a Psi (Fringe)-Watcher

C. Eugene Emery Jr. | Media Watch

Stephen Barrett | Health Watch

Ralph Estling | Forum

Joe Nickell | Investigative Files

Matt Nisbet | Generation sXeptic
Science in the Media
Science as Culture
The Science of Science Communication

Massimo Polidoro | Notes on a Strange World

Massimo Pigliucci | Thinking About Science
The Philosopher's Corner

Chris Mooney | Doubt and About

Benjamin Radford | Skeptical Inquiree

Robert Epstein | The Skeptical Psychologist

Kenneth Krause | Science Watch

Steven Novella | The Science of Medicine

Stuart Vyse | Behavior and Belief

James Randi | A Magician in the Laboratory

Harriet Hall | Reality Is the Best Medicine

Mick West | The Practical Skeptic

Robyn E. Blumner | Postcards from Reality

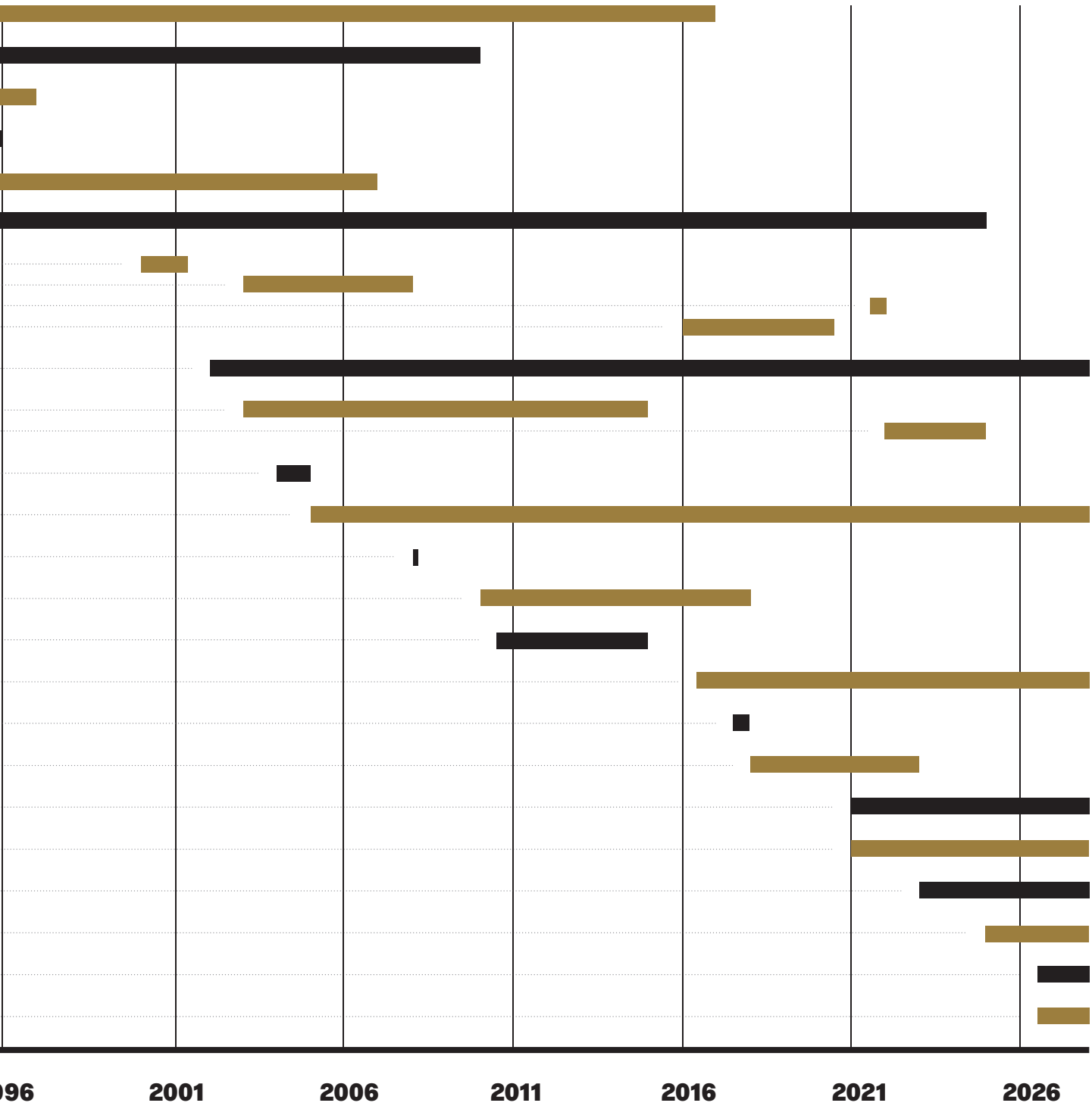
Craig Foster | The Time Warp

Andrea Love | Inside Immunity

Kenny Biddle | Biddle Me This

Melanie Trecek-King | The Missing Think

The First Fifty Years



[COMMENTARY

The Big—Widely Misunderstood—Bang

DANIEL WHITESON

The public has deeply misunderstood the Big Bang theory.

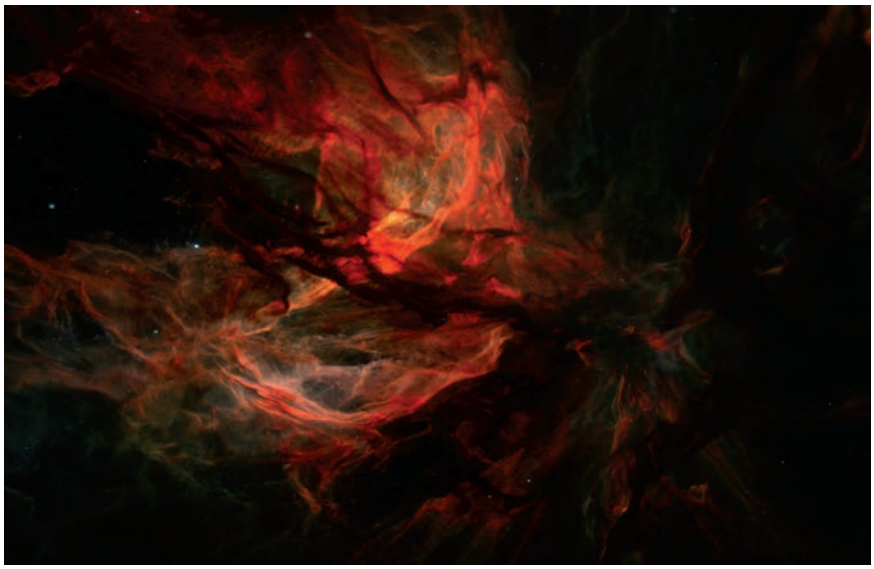
Most people think of the Big Bang as the creation of the universe around fourteen billion years ago when a tiny, dense point of matter exploded out into vast, empty space. Right? Wrong. This widespread version is not just wrong on the details but also on the essentials. And in a bit of cosmic irony, it is *less* weird and dramatic than the real scientific story. So, let's set the record straight.

First, there was no single dense point *in empty space*. The whole universe was already *filled* with frothing energy, which then expanded and cooled. The Big Bang was *everywhere*. This is a mind-blowing mental image, but it makes more sense than the single-point version, which can't answer reasonable questions such as "Where was it?" or "How did the light from the Big Bang get here?"

The single-point misunderstanding likely has its origins in confusion about how big "everywhere" was billions of years ago. We don't know whether the universe is currently infinite or vast but finite. If the universe is infinite now, then it always was, and the Big Bang theory describes an infinite universe, dense with infinite energy, that expanded over time to become more dilute. On the other hand, if the universe is finite, then it was smaller billions of years ago, perhaps even very small, but it was *always filled with energy*. A small-but-finite universe is not a dot of matter in empty space; it is all of space. *There was never empty space.*

A small, finite universe is not easy to visualize. The imagination can go awry by sketching in empty space around that itty bitty cosmos. But space *ends* at that boundary, so there are no locations outside or around it. There's just no *where* there. That tiny early universe isn't expanding *into* anything. It is everything, even as it expands and becomes a bigger, more dilute everything.

Second, the Big Bang was neither the birth of the universe nor the beginning of time—just the furthest back we can extrapolate with our laws of physics. The universe is getting less dense over time, so if you run the clock backward, you find that earlier the universe was denser. We can even see light from many billions of years ago, which con-



firms this early density (Dicke 1965). And we can mentally journey further back in time, another 380,000 years, to calculate how light and matter behaved when the cosmos was even denser. But this only works up to a point—about 13.8 billion years ago.

The obstacle is that our two great theories, quantum mechanics and general relativity, don't play well together beyond that density. Until someone figures out how to unify them, we have no solid prediction for what happened earlier. The Big Bang theory is the limit of our current understanding and an end to our scientific vision more than a beginning of the cosmos. Physics can take us deep into the past, but it can't tell us when or whether the universe had a beginning. It leaves these questions open rather than claiming to resolve them.

Where did all the energy come from? We don't know. There could have been a period of even more rapid inflation. There could have been a moment of infinite density, in a theory that totally ignores quantum mechanics and is confusingly called "the Big Bang singularity." There could have been a big crunch, a reverse expansion, or something else so weird we can't even imagine it without our brains going bang. But the Big Bang theory is agnostic on these options, and the certainty that is misattributed to science about the origins of the universe ends up as an easy-to-attack-and-ridicule strawman, undermining the credibility of science.

How did the popular-science version of the story become so divorced from the scientific version? It's something of a game of historical telephone, where scientists have been inconsistent about what the term *Big Bang* means (Hawking and Penrose 1970) and have used phrases such as "primeval atom" that were poetic but unclear (Lemaître 1931; 1950), leading to misrepresentations by well-respected journalists (Sullivan 1965).

Even the commonly told story about how the phrase "Big Bang" was coined is embarrassingly wrong. It's said that Fred Hoyle, an opponent to the idea, coined it as a dismissive slur in a live debate with George Gamow. Some of Gamow's collaborators have recounted this supposed event (Alpher and Herman 1997). The problem is that it never happened; there was no debate between Hoyle and Gamow. And while Hoyle did coin the phrase during a solo interview, there's no evidence he meant any disrespect by it (Kragh 2013).

The great tragedy is that the science-reading public is very likely to have the wrong idea about what we know about the early universe and how well we know it. It's time to clear things up! Nearly fourteen billion years ago, the universe was hot and dense with energy filling all of space, and it has been expanding and cooling since. We do not know where that energy came from or what happened earlier. It was not the beginning of the universe.

That is the *real* big bang. ■

References

Alpher, Ralph, and Robert Herman. 1997. *The George Gamow Symposium*. Astronomical Society of the Pacific Conference Series, vol. 49. San Francisco, CA: Astronomical Society of the Pacific.

Dicke, Robert H., P.J.E. Peebles, P.G. Roll, et al. 1965. Cosmic black-body radiation. *The Astrophysical Journal* 142: 414–419.

Hawking, Stephen, and Roger Penrose. 1970. The singularities of gravitational collapse and cosmology. *Proceedings of the Royal Society of London A* 314(1519): 529–548.

Kragh, Helge. 2013. Big Bang: The etymology of a name. *Astronomy & Geophysics* 54(2).

Lemaître, Georges. 1931. The beginning of the world from the point of view of quantum theory. *Nature* 127: 706.

———. 1950. *The Primeval Atom: An Essay on Cosmogony*. Translated by Betty H. Korff and Serge A. Korff. New York, NY: D. Van Nostrand Company.

Sullivan, Walter. 1965. Signals imply a 'Big Bang' universe. *The New York Times* (May 20).

Daniel Whiteson is a particle physicist, a professor at UC Irvine, and cohost of the podcast ***Daniel and Kelly's Extraordinary Universe***. He is the coauthor, with Andy Warner, of ***Do Aliens Speak Physics?***

Podcast Pairing

To hear Daniel Whiteson discuss the big bang with his co-host Kelly Weinersmith, listen to the episode titled "What Came Before the Big Bang?" (released on 9/25/25).

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Get the Most Out of CSICon (Part 2)

Celebrate Our History ... Chart Our Future!

EDITED BY STEPHEN HUPP

Editor's note: Most of the following descriptions were written by the CSICon speakers.

In the previous issue of Skeptical Inquirer, I presented an overview of the 2026 CSICon with an emphasis on the special events (some of which require an extra ticket in addition to general registration). In this issue, I'll share descriptions of most of the other presentations, which will all be included with general registration.

Mary Roach in Conversation with Richard Wiseman

Mary Roach has authored multiple best-selling nonfiction books, including *Grunt*, *Stiff*, and *Fuzz*. Her most recent best-seller—*Replaceable You: Adventures in Human Anatomy*—explores scientific advances (and ill-advised missteps) related to replacing body parts for medical reasons. She will be joined in conversation with Richard Wiseman, also a best-selling author of books such as *59 Seconds* and *The Luck Factor*. They will discuss the intersection of science communication and skeptical inquiry.

James Alcock: Fifty Years of the Modern Skeptical Movement

A half-century ago, a rising tide of pseudoscience and paranormal belief swept the Western world. In response, a small group of scholars, magicians, science writers, and others alarmed by the dearth of reaction from the scientific community banded together to found CSICOP, now the Committee for Skeptical Inquiry (CSI). This marked the beginning of the modern skeptical movement. While the Committee's survival for fifty years is in itself a signal accomplishment and reason for celebration, one cannot fully appreciate the passion and urgency with which it was founded, nor comprehend the magnitude of its achievements, without first understanding the societal context in which it took form. James Alcock knows that context well; he was there.

Eugenie Scott: Victoria's Secret (No, Not That One)

In 1987, the Bay Area Skeptics (BAS) conducted an exposé of faith healer W.V. Grant in San Francisco and Oakland. Eugenie Scott played a character named Victoria Patmore, who was there with her arthritic uncle, John, hoping to be healed of blindness. Victoria's secret, of course, was that she was maybe a little nearsighted but far from blind. Nonetheless, Grant employed a crowd-pleasing bit of theater to "cure" Victoria of her blindness. How did BAS pull off this exposé, and what were the repercussions? What lessons should skeptics take away from exposés of charlatans and scam artists?

Brian Brushwood and Perry Carpenter: Myth-Direction and Wolfmasking

We all see it: an AI-driven scampocalypse is coming … and it looks an awful lot like we're not prepared. In this session, Brian Brushwood and Perry Carpenter will briefly outline two important concepts to understand as part of a defensive arsenal: myth-direction, where scammers embed their payload inside familiar stories and worldviews, and wolfmasking, Brushwood's deceptive roleplay technique that reveals the narrative tricks of fraudsters. With quick, surprising examples, they reveal how easily even careful, skeptical thinkers can be steered off course. You'll leave with a sharper sense of how these tricks work—and a stronger instinct for resisting them.

Michael Mann: Science under Siege (Part 1)

From pandemics to the climate crisis, humanity faces tougher challenges than ever. Whether it's the health of our people or the health of our planet, we know we are on an unsustainable path. But our efforts to effectively tackle these existential crises are now hampered by a common threat: politically and ideologically motivated opposition to science. Michael Mann discusses his collaboration with public health scientist Peter Hotez, examining the five forces—plutocrats, pros, petrostates, phonies, and the press—behind the modern-day anti-science movement, informed by their decades of experience on the frontlines of the battle to convey accurate, reliable, and trustworthy information about science in the face of determined and nihilistic opposition. Focusing in this first talk on the climate crisis, Mann will discuss how we can be empowered to promote scientific truths, shine light on chan-

nels of dark money, dismantle the corporations poisoning the planet, and ultimately avert disaster.

Peter Hotez: Science under Siege (Part 2)

For a second presentaton on pandemic denialism, we have seen how antivaccine activism that first accelerated in the early 2000s finally erupted to cause widespread COVID-19 deaths in America. This was especially apparent in states such as Texas where the antivaccine movement combined with libertarian "health freedom" rhetoric. In all, at least 200,000 Americans needlessly perished because they refused vaccines during waves of the delta and BA.1 variants in 2021–2022. They became victims of a coordinated health and science disinformation campaign championed by the Murdoch media, their allied podcasters, and even some extremist members of the U.S. Congress. This went beyond protesting vaccine mandates; they falsely discredited the effectiveness and safety of COVID-19 vaccines and then targeted COVID-19 scientists to portray them as public enemies. Piling on was a wellness and influencer industry that peddled anti-parasitic drugs (e.g., ivermectin, hydroxychloroquine) as viable alternatives even though they do nothing to prevent or treat COVID-19. This dark aspect of the wellness influencers now pervades the U.S. government's current Make America Healthy Again agenda. Yet there's still time to fix this and rescue our national biosecurity.

Andrea Love: Sanitizing Snake Oil Harms Public Health

Wellness misinformation didn't explode just through the actions of influencers and profiteers; it's been helped by health and science professionals who have conflated neutrality for diplomacy. Neutrality isn't neutral; it is permission to deceive. Minimizing health misinformation delays diagnoses, increases healthcare costs, legitimizes dangerous wellness ideology, and causes real and tangible harm. Sanitizing snake oil in the name of "balance" doesn't educate the public; it emboldens the very people eroding science and public health for profit.

Rina Raphael and Nick Tiller: The United States of Pseudoscience

A quarter of the way through the twenty-first century, we're in an age of unprecedented scientific progress. Yet as humanity bathes in a sea of scientific and technological abundance, we're somehow drowning in pseudoscience. Nowhere is this paradox sharper than in the United States: a global leader in research and innovation that also tops the world in sales of dietary supplements, alternative therapies, spiritual "wellness," and even tarot cards. What is it about American values that allow pseudoscience to thrive? Is there something in the nation's cultural DNA that makes it uniquely susceptible to baseless claims? Join Rina Raphael and Nick Tiller as they pull back the curtain on the trillion-dollar wellness con and its implications for public health. Together, they'll trace the roots of the American ideals that foster wishful thinking and examine how cultural diversity, political division, and religiosity shape health habits and policy. In the land of opportunity, has "irrational optimism" become a recipe for success or delusion?

Richard Wiseman: How Skepticism Changed Psychology, Science, and the World

Researching the paranormal is often seen as a fringe activity. However, this pioneering work has changed the course of science, uncovered exciting insights into how we think, and been a catalyst for many famous experiments. Celebrate the impact of critical thinking and discover why skepticism matters.

Benjamin Radford: Reflections from the Frontlines: Investigative Skepticism in Action

There are many varieties of skepticism, from the philosophical skepticism of David Hume and Paul Kurtz to the pop culture skepticism of Penn & Teller and *South Park*. But just as important is the investigative skepticism embodied by Harry Houdini, James Randi, Joe Nickell, and others. CSI Research Fellow Benjamin Radford will reflect on his own decades of in-the-trenches work in investigative skepticism and promoting critical thinking.

Stuart Vyse: Welcome to the Burned-Over District!

In the eighteenth and nineteenth centuries, western New York State—including the city of Buffalo—was the breeding ground for a surprising number of new religious movements, utopian communities, and superstitious ideas. The Fox sisters launched spiritualism in the Rochester area, but several other threads of the spiritualist movement stem from Western New York. Finally, long before the Center for Inquiry was founded, this area provided early examples of skeptical tests of paranormal beliefs. Stuart Vyse will take you on a tour of this fascinating burned-over district.

Scott Hamilton Kennedy: Science and Storytelling

In this cinematic talk, Academy Award–nominated filmmaker Scott Hamilton Kennedy will be speaking on his two powerful and prescient documentaries, *Food Evolution* and *Shot in the Arm*, both of which foreshadowed what has become Robert F. Kennedy Jr.'s Make America Healthy Again movement. He will share clips, candid insights, and concrete tactics to counter misinformation and science denial with mankind's greatest tool for solving difficult challenges: storytelling.

***Heathens* Movie Screening (David Cowan and Shawn Hardin)**

Experience a special screening of the new documentary *Heathens*. In small-town America, where belief defines belonging, five former Protestants boldly come out of hiding—not for who they love, but for what they no longer believe. Facing estrangement, job loss, and retaliation, they risk everything for honesty. Drawing on groundbreaking research on religious trauma, *Heathens* reveals the hidden costs of leaving faith—and the contagious courage of those who refuse to stay silent. Richard Dawkins has called *Heathens* "A deeply moving, even shocking, film." After the screening, the film's creators—David Cowan and Shawn Hardin—will participate

in an enthralling Q&A session.

***Skeptical Inquirer Presents*: The Fast Talkers (Hosted by Justin Robert Young)**

Comedian Justin Robert Young hosts a new event called *Skeptical Inquirer Presents*: The Fast Talkers, in which presenters will zip through lightning-fast presentations that will keep you on the edge of your seat!

- **Meagan Ankney: Monsters in the Machine.** The cohost of the *Spooky Science Sisters* podcast reflects on the word *folklore*, which traditionally evokes thoughts of ancient tales told around campfires, passed down and reshaped across generations. But in the age of the internet, we've traded the campfire for comment sections, and we've fundamentally changed how new legends emerge and spread. This presentation will explore the rise of digital folklore, from early creepypasta-era beings such as the Black-Eyed Children to newer phenomena such as the Not Deer and so-called "rules" for living in Appalachia. It will also examine the challenges skeptics face when these modern legends are mistaken for truth in online spaces, where rapidly shifting narratives and confirmation biases are fueled by powerful social-media algorithms.
- **Dan Wilson: Moving Forward in the Fight against the Anti-Vaccine Movement.** The anti-vaccine movement has more power in America now than ever before. The scientific community needs to use every tool and opportunity available to push back. Over the past five years, Dan Wilson, host of the *Debunk the Funk* YouTube channel, has been in the trenches of vaccine misinformation online. He'll share what he's learned and his perspective on how we can do better in educating the public and debunking unscientific claims.
- **Malorie Mackey: Chasing Shadows.** Explorers venture into the unknown seeking discovery, but what happens when hope becomes our compass? Drawing from cases of collecting hard data and fieldwork in remote communities, this presentation examines how our desires—especially in emotionally charged scenarios such as species extinction or in delicate situations such as in dramatically different cultural settings—can subtly skew observations and corrupt data. Malorie Mackey will explore the delicate balance between maintaining scientific skepticism and respecting cultural knowledge, showing how the best exploration requires us to recognize when we're chasing shadows instead of truth. Mackey recently coauthored a Skeptical Inquirer cover story about *Wicked*, in which she and her husband explored this delicate balance.
- **Katie Suleta: Skeptical Mentorship.** Every movement aspiring to sustain cultural influence and staying power must dedicate substantial resources to youth outreach and education. Amid a landscape marked by regressive leadership and policies in crucial areas such as science and health, the need for the skeptical community to proactively focus on cultivating and empowering young critical thinkers has never been more urgent. Skeptical mentorship is necessary and is a critical investment for safeguarding rational discourse in the future and training the next generation of critical thinkers. Katie Suleta recently appeared on the cover of Skeptical Inquirer (along with Bill Nye, Michael Mann, Peter Hotez, Bertha Vazquez, and Dan Wilson) to discuss the disturbing attacks on science.

See Part 1 of this article in the previous issue of SI to learn tips related to CSICon and to learn more about the following events:

- The Center for Inquiry History and Mystery Tour
- Investigating Extraordinary Claims Workshop
- Don't Believe Everything You Believe Workshop
- Magic for Skeptics Workshop
- Opening Reception and Presentation
- History and International Panels
- *Skeptics' Guide to the Universe* Live Podcast
- Banachek's *Telepathy* Show
- A Skeptical Extravaganza of Special Significance
- VIP Luncheon and Panel
- Project Alpha Interview
- 50th Anniversary Awards Dinner and Mystifying Variety Show
- Fireside Chat with Bill Nye
- Sunday Speakers Session
- Trip to Niagara Falls and Maid of the Mist Boat Ride ■

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Stephen Hupp is the executive director of CSI and editor of Skeptical Inquirer.

Adult Recollections of Holding Therapy Experienced during Youth

Some unconventional psychological treatments can be both ineffective and disturbing for children, but can they do lasting harm? This article tells the stories of six adults who went through a painful and frightening pseudoscientific therapy as children and who believe the experience has had ill effects that persist decades later.

JEAN MERCER

Efforts to create psychological change by forceful physical treatment date back centuries and include cold water therapies, spinning for vestibular stimulation, electroshock, circumcision, and lobotomy. In the 1960s, late Californian psychologist Robert Zaslow proposed that mental health problems such as autism could be treated by physically restraining the patient for hours at a time, shouting and grabbing the face and jaw, and prodding the torso and armpits painfully. Zaslow argued that these methods were associated with forcing the patient to make an emotional attachment, which he considered a paramount step for mental health (Zaslow and Menta 1975). Zaslow lost his psychology license after seriously injuring an adult patient, but followers continued to use his methods with children, who were of course easier to restrain than adults.

Organizations and clinics using Zaslow's methods on children operated primarily in Colorado and Utah (Mercer et al. 2003). Whereas Zaslow had claimed to treat autism and some more general psychological problems, clinics had by the late 1980s and 1990s changed their focus to attachment disorders, which they argued were common in adopted children. Disobedience and disruptive behavior were attributed to these attachment disorders. Misunderstandings of attachment and disorders of attachment were and remain common (Allen 2018); such misunderstandings were and may still be associated with the use of holding therapy.

New York psychiatrist Martha Welch also began using the therapy with autistic patients but later agreed with the focus on attachment disorders. Ultimately, she said that her holding techniques should be used every day with every child to foster mother-child relationships. Welch met Elisabeth Tinbergen, wife of Nobel laureate in physiology Nikolaas Tinbergen, and impressed both Tinbergens with her thinking, which paralleled some of Tinbergen's theories. Tinbergen's Nobel Prize lecture discussed physical treatments for psychological disorders and proposed that autism was a stress disorder (Tinbergen 1973). In 1983, the Tinbergens published a book praising the methods used by Welch and Czech-German therapist Jirina Prekop. Following that book's publication, in 1989 Welch published *Holding Time*, in which she claimed that daily holding by the Welch methods would prevent tantrums and sibling rivalry.

The Colorado and Utah clinics and Welch's Mothering Center in Connecticut continued to use holding therapy freely, and the methods were taught and approved in Georgia and some other states into the 2000s. Because of the argument that holding therapy affected emotional attachment, holding methods were increasingly referred to as "attachment therapy." However, enthusiasm for these methods abated with the death of ten-year-old Candace Newmaker at a Colorado facility in 2000 (Mercer et al. 2003). As holding therapy survivors have aged, they have become more interested in talking about their experiences and have formed a Facebook group called Attachment Therapy Is Wrong.

The extent to which holding therapy is in current use with children and adolescents is unclear. In the past, mental health professionals who held certain unconventional beliefs about attachment were also likely to approve of holding therapy, and holders of such beliefs are still active (Allen 2018). Whether they all continue to use holding therapy, however, is not known. On its website, the adoption agency Holt International features the reissued book *Adopting the Hurt Child* (Keck and Kupecky 2009), whose foreword is by holding therapy practitioner and author Foster Cline. In Ohio, the organization Adoption and Attachment Therapy Partners suggests reading both the Keck and Kupecky book and Arleta James's *The Science of Parenting Adopted Children* (James 2019), another holding therapy–oriented volume. The internet source PsychCentral cites an article by Jane Wimmer, M. Elizabeth Vonk, and Patrick Bordnick (2009) based on a project to teach holding therapy to foster parents in the state of Georgia. These facts suggest a continuing positive attitude about holding therapy in some quarters but do not necessarily demonstrate that holding therapy is still practiced.

Setting Up the Interviews

Six individuals contacted me and expressed interest in discussing their holding therapy experiences. They were aware of my previous work critiquing holding therapy and wanted both to provide information and to gain greater understanding of what had happened to them. I made contact with two men and four women; two now live in the United States, one lives in Canada, and three live in the United Kingdom.

All were in their late twenties or older, and all but two were married; four had children. Only two of the participants had received exactly the same form of holding therapy. I received Institutional Review Board permission from my university, and all participants signed informed consent documents.

Participants were assured that no identifying material about them would be included in this article. They were given opportunities to read the draft and remove any material they considered identifiable. To ensure anonymity for the participants, their narratives were assigned unisex names and the neutral plural pronoun, and residences and similar facts were omitted. This approach was considered necessary because participants had for years kept their holding therapy experiences secret, and some felt they would be stigmatized if their identity could be guessed. There were also concerns about whether participants or I might be targets of defamation lawsuits by therapists, some of whom are still alive.

I conducted the interviews via Zoom, and they were not recorded to assure anonymity. I took notes by hand during the interviews; if the notes were ambiguous, I contacted the interviewee again to ask for clarification. I began the interviews with a simple request for "your story." The interviewees fluently recounted their experiences, including their family situations, reasons for using holding therapy, and details of the treatment experiences.

Addison: Experience of Treatment by Zaslow

Addison was coincidentally reminded of their childhood experiences shortly before contacting me. Addison, along with their siblings, had been subjected to treatment by Zaslow during the late 1960s. Addison described the family as "Bohemian" at that time and as living near the university where Zaslow taught. They had friends studying psychology, and both parents audited Zaslow's class. In Addison's recollection, their eldest sibling was brought to Zaslow for treatment because of inattention/hyperactivity and possible autism. Addison is of the opinion that their father was also possibly showing symptoms of autism.

Addison recalls only one holding session with Zaslow; they would have been preschool-age at the time. Another of their siblings had more sessions, but the eldest got the brunt of the treatment, which involved being restrained in the supine position by several adults, tickled and prodded, and grabbed by the face while adults shouted at them.

Addison stated that they had looked up Zaslow years ago because they were "mad at him." The eldest sibling, who received the most holding sessions, is estranged from the family. The family did not discuss with each other the experiences they had in Zaslow's treatment.

Bennett: Experience with a Holding Therapy Clinic

Bennett was adopted at preschool age after being in foster care from the age of four months. At about age ten, they were told they were adopted and began to act out. At twelve, in 1994, Bennett was charged with stealing cars and weapons. Their parents consulted a social worker, who suggested that Bennett should be treated at a facility that focused on holding therapy as a treatment for adopted children who were acting out. Bennett was released from juvenile detention to go to the facility with their parents and a social worker; their parents had been told not to tell Bennett the plan, and they did not.

On the first day in the facility, Bennett's parents went to the respite home where Bennett was to stay and talked to a girl who had been there for two years. She gave a good report of the place. Bennett was taken to the home, which was run by "Connie," who they now believe was Connell Watkins, one of the therapists sentenced to prison following the holding therapy death of Candace Newmaker. A man and some children were also present in the home, in addition to Bennett and two others who were there for treatment. Bennett stayed in a room without windows, and all the children's doors had alarms.

Bennett was given chores to do, including scrubbing an oven until their fingers were raw. They also experienced a holding therapy session. Bennett lay with their head on the therapist's lap while being observed through a one-way mirror. The therapist insulted Bennett until they began to scream. The therapist knew embarrassing secrets that Bennett's parents had revealed and used them to manipulate Bennett. Bennett was instructed to scream specific things and to do it louder. They do not remember being told to scream anything about killing, though this has been reported as part of other holding therapy sessions at the same facility.

On their third day, Bennett was told to take out the garbage and took the opportunity to run away. They reached a nearby road, believing it might be possible to hitchhike the long distance home. Bennett was picked up by a young couple and was eventually taken to a bus station where they caught a bus to a nearby city. There, wandering the streets, Bennett was taken under the wing of a young male prostitute who protected them until the city police saw Bennett and took the child to a juvenile center. Bennett's parents and the social worker who had accompanied them to the facility picked Bennett up and returned them to the clinic, where they stayed for some days.

Bennett's parents had several sessions with staff therapists, and Bennett wandered around until two adults who worked as cleaners at the clinic took them to their farm and said they did not agree with holding therapy. Eventually, Bennett was accused of keying some cars in the parking lot, and their parents were told they must be taken home. Some time in residential treatment followed, and, according to Bennett, the new treatment center (without holding therapy) was helpful.

Bennett had not heard about the death of Candace Newmaker, which took place at the same facility in 2000, until two years ago. Learning this fact, with all its implications about what might have happened to them, made them want to go into conventional therapy. They realized they needed to deal with the past.

Bennett's present take on holding therapy is that the

therapists tried to break them like a horse being tamed, but holding therapy did not break Bennett. This view of holding therapy as an authoritarian process extended to Bennett's memories of the social worker who accompanied the parents to the facility. Bennett described how the social worker made people do push-ups when they were not "truthful"—not just the children but the parents as well. Bennett believes their parents were conned into using holding therapy as a form of treatment.

When asked about the long-term effects of their experience with holding therapy and related events, Bennett commented on the fact that the therapists they have seen in adulthood have heard of holding therapy but have not expected to come across it. Bennett noted that my interview with them was the first time they have described the experience in detail to anyone, even a therapist. The therapists are aware that holding therapy is a touchy subject for Bennett.

Bennett has recently begun to discuss their experiences with their parents. The parents now report that the facility staff said that Bennett was likely to kill them, but they say this did not affect them. They described the staff as terrified that Bennett would claim to have been sexually assaulted.

Bennett described both positive and negative outcomes from their experiences. They noted that people do not want it known that they have been abused because of the associated stigma. Bennett attributes feelings of shame and worthlessness to their experiences. They have never talked to their own children about what happened. Bennett strongly dislikes being yelled at or hearing a voice that reminds them of "Connie." But on the positive side, there is a sense that having survived holding therapy means they can survive anything. Also, Bennett feels they learned not to judge people. For example, the male prostitute, whom they might have regarded negatively, was helpful and protective, preventing serious problems from occurring (although this part of the experience was not an aspect of holding therapy).

Leslie: Experiences with Holding Therapy as Formulated by Welch

In the mid-1980s, Leslie's parents thought Leslie's sibling had autism and took them for holding therapy using the Welch model (see Welch 1989). Leslie's parents also put them through the therapy. In the Welch model, the therapist acts as a coach and the parents (especially the mother) do the holding. The whole family was involved in the holding process. Leslie remembers the sessions as hot, overstimulating, and loud, with five to eight families present holding screaming children. Leslie's mother held Leslie on her lap and talked about things that made her angry, such as Leslie's failure to clean their room. Leslie was held across the mother's lap, with the mother holding Leslie's arms with one hand and legs with the other. Leslie was never lain on, though this was a part of the Welch method for older children. The mother grabbed and held Leslie's chin as she talked to Leslie. The Welch method aimed to make children angry and distraught, then cuddle them when they were exhausted. The holding period lasted an hour or more each time.

The details just given were described spontaneously in the interview with Leslie. In a follow-up email, however, Leslie responded only after a delay to a question about whether the treatment ever included licking their face. Leslie said this had occurred and referred to this memory as "triggering." I asked the question because licking was mentioned in discussions with some other interviewees.

Sessions with the therapist present occurred roughly weekly. At home, holding therapy was done "as needed" if someone was angry. If Leslie was angry, they were held; this was described in Leslie's interview as "terrible." Their mother held the child's head, and the father held the rest of the body. After the child stopped struggling, cuddling and kisses followed. The therapist sessions and home events were continued for about a year, then were stopped. Leslie recalls that during this time they made an inner vow that they did not need parents.

When asked why their parents used holding therapy, Leslie replied that the sibling's assumed autism was hard on the mother. She was susceptible to anyone who offered help. In addition, she had watched a lengthy television program that referred to Welch's methods and sought the treatment for that reason.

Leslie's family does not discuss holding therapy much, although Leslie says their mother has expressed regret about trusting Welch's methods. The sibling has remarked on how terrible holding therapy was. About ten years ago, Leslie started some conversation in the family about how the therapy was a "horrible thing" and a "piece of shame" for the family.

Leslie began to remember a lot about the experience when they were twenty-seven and talking to a friend. Leslie remembered the experiences and felt their memories indicated a "huge wound." Leslie talked to a therapist and went to graduate school. About ten years before the interviews, Leslie thought the issue was "done"; they married and had children. When Leslie's children were about four years old (at different times), memories of her own childhood returned. Leslie thought about "what small innocent people" they were at the age when Leslie had experienced holding therapy.

Leslie remains anxious about situations where there are loud, chaotic, out-of-control people, especially their own children when they are "all swirling around me." Leslie also felt angry and distressed recently when their mother put an arm around them; they still dislike being touched on the face.

Darcy: Experience of a Variant on the Welch Model

Darcy was the eldest of three children and was three when a brother was born in the early 1980s. The children's mother was distressed that Darcy, the eldest child, did not cling to her after the new baby was born but instead began to go to the bedroom alone and incidentally to masturbate. The mother was very concerned about what she saw as a withdrawal and disconnection and wanted Darcy to express their

feelings to her. The mother took Darcy to a nearby "mothering center," where a counselor was a proponent of holding therapy.

As an adult, Darcy wrote their memories of the holding therapy process. They said that because they were new to holding therapy, the counselor knelt beside the mat they used for holding to show the mother how it worked. The first part was to restrain the child by clamping the child's legs between the adult's thighs and pinning the child's arms to the ground. The next part was to get the child to make nonstop eye contact; the child could not close their eyes or look away. Then the mother started talking about the child's baby brother, encouraging the child to express anger that they could no longer have all the mother's attention. Darcy's memory was that they tried to go along with this because they wanted to be good, particularly in front of strangers. What was happening around them was disturbing—children crying, screaming, and squirming and their parents shouting into their faces, according to Darcy's description.

In the interview, Darcy said they remember their dread, and that it was shameful and humiliating to see the other kids in this situation. The focus was on anger and the sense that the mother wanted Darcy to be allowed to feel angry. Darcy says their mother believed that holding therapy could cure autism.

Darcy's mother continued holding therapy at home, conducting sessions of an hour long or more. These occurred every day at the beginning, and later on every couple of weeks. The family moved to another town when Darcy was five, but the mother kept up the contact with the holding therapy counselor by phone. Darcy recalls that feeling the mother's breath was disturbing. The holding therapy sessions continued for years, with the mother doing most of the holding and the father helping. The children also helped in each other's holding. Darcy was sometimes asked, "Do you think you need holding?" Holding therapy followed, no matter how they responded. Darcy recalls that if they held the mother's hands and maintained eye contact, sometimes they could avoid being lain on or having their face licked, although those events were ordinarily part of the holding therapy session. But generally, it was assumed that if a child said they did not need holding, that meant they did need it.

The last time Darcy's mother tried to hold them was after Darcy started college. Darcy was too big for the parents to hold and told them, "If you do this to me, I'll never come back." Darcy now reports that they could have stopped the holding earlier in their teens but continued to comply because they felt responsible for keeping the mother on an "even keel." In addition, Darcy said they still feel confused about why they did not make the holding stop.

Darcy's parents would also hold each other in a technique recommended by Welch for couples. They quarreled and had physical fights. The mother experienced what she called recovered memories of her own abuse.

Today, Darcy finds it hard to go to therapy. They resist talking about feelings and even dislike the statements of opinion asked for in an eye exam, because they feel pressure just to say whatever might be wanted. Part of the problem with therapy, for Darcy, is that most therapists have not heard of holding therapy.

Esme: Experience of a Variant of the Welch Model

Esme reports having been held using holding therapy methods from birth until age fifteen, when they got too strong for the parents to do it. There was no specific problem that the therapy was intended to "cure," but the parents were presumably following the advice of Welch's 1989 book in which she presented holding as needed for all children and a preventative of common problems, such as tantrums and sibling rivalry.

The earliest holding method Esme experienced involved a cradling position, with the mother restraining the top of the child's body and the father restraining the bottom half. The hold took one to two hours each time. By the time Esme was about ten, they were pinned down on the floor or the bed. The mother would grab Esme's chin, make eye contact, and demand "Look at me!" She would also lick Esme's face, which Esme in the interview described as "one of the most violating things."

The mother would tickle Esme to make them angry. The tickling would be on the sides, feet, knees, and groin.

Esme described the timeline of a hold in this way: the child would initially resist and refuse to be held, and tickling would follow "for a long time." Esme would eventually be broken down, and there would be a sudden turnaround. The mother would ask, "Are you angry because of [some event]?" Esme might answer, "It's because you love [sibling] more." This would be followed by crying and then a loving exchange, after which Esme would go off alone for a while.

Esme's holds occurred every two or three weeks. The holding therapy session was considered not punitive but was the parents' reaction to "bad behavior," such as displays of anger. Esme's family's friends generally did not know that holding therapy was being used. The mother's best friend started using the therapy with her children but then stopped. Esme was not told holding therapy was a secret but knew not to talk about it. In Esme's interview, they said they could not come to terms with whether the therapy was wrong because every hold ended on a positive, affectionate note. They were not sure whether the therapy was "really bad" or whether it was just an excuse for blaming one's parents.

Esme also reported that their parents had "horrific" physical fights. Esme would close the windows so outsiders would not hear the noise.

During the interview, Esme spontaneously proposed a discussion of the effects of holding therapy on their later life. Two or three years before the interview, Esme began conventional therapy because of a sense of having "crossed a line" when angry at work. They were then aware of having been angry for a long time. When Esme told the therapist about holding therapy, she "took a dim view" of the method, which she had heard of.

In describing what they consider to have been the consequences of holding therapy, Esme noted a concern with control: wanting to be in control and sometimes going too far. They feel they may overstep because they find disorganization stressful and think this may come from holding therapy.

Esme reported that they find it difficult to deal with emotions on their own and can do this only with their spouse. They have an expectation about expressing emotions that someone else will "force it out" of them. In addition, Esme described an uncertainty about "whose emotion it is." Their memory of holding therapy is that it was a way to act out the mother's emotions, and that they would say anything to end the hold. At the time of a hold, they felt their statements of emotion were real but now think that it was probably what the mother wanted to hear. Esme also mentioned always being "analytical" about others' emotions, that a reason for emotion always had to be found, and that repair was needed, as if holding therapy gave them the job of fixing their mother's feelings. This leads to a sense of confusion about one's feelings and is emotional rather than cognitive confusion.

Campbell: A More Recent Clinic Experience

Campbell was younger than most of the other interviewees and reported having experienced holding therapy within the past fifteen years. They had been diagnosed with depression in their early teens and hospitalized for a week or so at age seventeen.

Campbell reported that they had always had a distant relationship with their mother and had sought other older women in the hope of closeness; Campbell described these problems as "attachment issues." When Campbell was released from the hospital, it was recommended to the parents that they take the teenager to a nearby clinic (in the midwestern area of the United States) that specialized in attachment concerns. The clinic's website currently states that staff were trained by the late Gregory Keck of the Cleveland Attachment and Bonding Center of Ohio, at one time a proponent of holding therapy. Campbell's parents took them to the clinic without being aware of holding therapy practices.

Campbell was assigned to a therapist who worked with them and the parents through talk therapy for about three months. On one day, however, the therapist tried a holding therapy session. She gave Campbell instructions about what they should do but did not describe the entire protocol. Campbell describes themself as having been a compliant kid who followed the instructions to lie across the laps of the parents as they sat side by side. Campbell had one arm by their side and one around the mother. The mother held Campbell's arms in place, and the father put his arms across Campbell's legs.

Campbell was instructed to make continuous eye contact with the mother and would be reminded by the therapist if they looked away. This situation was experienced as "horribly uncomfortable." Campbell decided they wanted to get up and began to rise, but the therapist hurried over and pushed Campbell's shoulder back down, saying, "you're doing fine; stay there." Campbell recalls this part of the session as taking about ten to fifteen minutes but does not remember what happened later or how long the rest of the session took. The stated goal was to share feelings, "to bond us," and for Campbell and their mother to talk to each other, but Campbell does not remember that they did so. Campbell reported that they think they dissociated during the rest of the session. Campbell continued to see the same therapist after this session, but holding therapy was not used further.

Campbell said they have since learned from their parents that the therapist had implied that the therapy was well researched and validated. The therapist proposed that Campbell be taken out of school for a two-week "intensive" program. The mother responded that Campbell would not allow her, the mother, to hold them; the therapist said they would have to use force to make Campbell cooperate. Campbell's mother has now told her that the therapist also mentioned "rebirthing" as an option, despite the highly publicized child death that had occurred some years before. The mother was at this time talking to the therapist almost every day. The parents consulted a friend who was a child psychologist, and when that person advised them not to do the "intensive," they decided to follow that advice.

Campbell noted that they have since learned from the parents and others that the clinic used live video for the parents and others to watch Campbell in what they thought were private therapy sessions or at times when they thought they were alone. When Campbell contacted people who had done Google reviews of the clinic, one parent described having watched their child on video. Campbell also found that the therapist disclosed to the mother statements that Campbell had thought were private.

Asked whether they felt that the holding therapy experience was still affecting them, Campbell described their difficulty in trusting therapists and what they described as "trauma responses." Campbell said that just being in the therapy office can trigger feelings of being "stuck." They described a reluctance to walk past the therapist to leave and said that the current therapist goes to sit at her desk so Campbell can leave the room without directly passing her.

Campbell said in an email following the interview: "When I speak in depth about my HT experience in therapy, I often will feel spaced out and like I am not fully in my body … I frequently lose feeling in my hands or arms, which I believe could be related to my arms being pinned down." In another email, they referred to "feeling deep, deep shame whenever I think about my HT experience. I struggle a lot in therapy with the feeling that *I* did something bad by participating in HT."

Corroborating Anecdotal Accounts

Although recalled childhood memories have potential for error, the reported memories by the interviewees generally jibe with descriptions of holding therapy by Tinbergen and Tinbergen (1983), Welch (1989), and Zaslow and Menta (1975). The children were physically restrained in positions

ranging from on the therapist's or parent's lap to a supine position with the therapist or parent lying on top of them. Eye contact was demanded, and the child's face was grasped and turned toward the adult. The children cried, struggled, and argued but eventually capitulated.

The only element of holding therapy that was mentioned by interviewees but not described in these sources was face licking. Even the detailed description given by Welch (1989) does not seem to include this component, which interviewees considered among the most intrusive and disturbing aspects of the therapy. In the early 2000s, Colorado social worker Neil Feinberg was disciplined for licking a child's face during treatment intended for reactive attachment disorder. Feinberg stated that he learned the technique from Welch (North Texas Skeptics 2004). It is not clear how such a method could have been created, but face licking seems congruent with the Tinbergen approach, in which natural human parenting was seen as resembling care actions of other mammals with their young, in which licking plays a major role. Welch's association with the Tinbergens suggests that she would have received support for this idea. Tinbergen's 1973 Nobel Prize lecture argued for the role of physical touch and positioning in treating stress disorders but did not mention licking particularly.

The Consequences of Holding Therapy

All the interviewees reported problems in adulthood they attributed to their holding therapy experiences. This attribution seems reasonable, because many aspects of the therapy would be considered abusive if they had been done to a child by anyone except the parents. Additionally, some of the interviewees associated their difficulty with therapy in adulthood with their previous holding therapy experiences. It is certainly plausible and possible that the holding therapy experiences played a causal role in the adult difficulties reported by the interviewees.

To be fair, these apparently candid interviewees also reported childhood experiences other than holding therapy that might be associated with later troubles, and their parents were also seeking assistance for reasons that existed prior to the holding therapy.

Should possible negative effects of a therapy be considered acceptable? This might be the case if there were adequate evidence that the treatment was effective. Many medical treatments have unwanted effects, and adverse effects of psychotherapy are also possible (Dimidjian and Hollon 2010; Linden 2013). However, there is no published research on holding therapy that meets evidentiary standards.

Conclusion

As is the case for most retrospective studies, this series of interviews has the problem of verifying the events reported from decades ago. Some of the parents and therapists are still alive, but the reports of interviewees suggest that it is extremely unlikely that they would respond to queries. In any case, there are no public records of the holding therapy events.

The interviewees whose narratives are presented in this article believe that holding therapy methods were not only painful and frightening for them in childhood but have left them with long-term distress and some interpersonal difficulties. Although it is not possible on the basis of these interviews to know whether holding therapy had the effects attributed to it by the interviewees, it may be constructive to assume that the participants' assumptions are correct and to put these to use in working with clients who have experienced holding therapy.

Therapists should be sure to explore clients' experiences with holding therapy (or indeed with any other unconventional treatment) if there is any indication that these have occurred. People who were adopted may be somewhat more likely than others to have experienced holding therapy, and LGBTQ clients may have experienced holding therapy in the course of "conversion therapy." People who were once or are presently diagnosed with autism may have been through holding therapy. Interviewees spoke of trying to forget holding therapy experiences, not thinking of them for extended periods of time, but also having "triggering" effects when reminded of the events. ■

References

Allen, B. 2018. Misperceptions of reactive attachment disorder persist: Poor method and unsupported conclusions. *Research in Developmental Disabilities* 77: 24–29.

Dimidjian, S., and S. Hollon. 2010. How would we know if psychotherapy were harmful? *American Psychologist* 65: 21–23.

James, A. 2019. *The Science of Parenting Adopted Children*. London, UK: Jessica Kingsley.

Keck, G., and R. Kupecky. 2009. *Adopting the Hurt Child*. Colorado Springs, CO: NavPress.

Linden, M. 2013. How to define, find and classify side effects in psychotherapy: From unwanted events to adverse treatment reactions. *Clinical Psychology & Psychotherapy* 20: 286–296.

Mercer, J., L. Sarner, and L. Rosa. 2003. *Attachment Therapy on Trial*. Westport, CT: Praeger.

North Texas Skeptics. 2004. Taking his licks: Colorado attachment therapist disciplined, again. *Skeptical News* (May 16). Online at ntskeptics.org/news/news2004-05-16.htm.

Tinbergen, N. 1973. Ethology and stress diseases. Nobel Prize Lecture (December 12). Online at https://www.nobelprize.org/uploads/2018/06/tinbergen-lecture.pdf.

Tinbergen, N., and E. Tinbergen. 1983. *"Autistic" Children: New Hope for a Cure.* Sydney, AU: Allen & Unwin.

Welch, M. 1989. *Holding Time*. New York, NY: Simon & Schuster.

Wimmer, J., M. Vonk, and P. Bordnick. 2009. A preliminary investigation of the effectiveness of attachment therapy for adopted children with reactive attachment disorder. *Child and Adolescent Social Work Journal* 26: 351–360.

Zaslow, R., and M. Menta. 1975. *The Psychology of the Z-Process*. San Jose, CA: San Jose State University Press.

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A Skeptical Guide to Glyphosate: Toolkit for Ten Common Claims

Claims about the herbicide glyphosate underlie public concerns from the supermarket to the courtroom. Here we critically discuss the chemistry, usage, risks, and associated misinformation ecosystems.

KEVIN FOLTA, ANDREA LOVE, AND NICOLE KELLER

Agricultural advances have made farming and our foods safer and more abundant than at any other time in history. Everyone wants safe food and sustainable farming. But modern technologies are victims of their own success, and media ecosystems exacerbate confusion. And while everything is a *chemical*—and chemicals enable food production—the word evokes fear and anxiety. Well-funded disinformation campaigns exploit this chemophobia to sow fear about the dangers of specific technologies, which undermine consumer confidence in agriculture and our food.

Few chemicals are more vilified than the herbicide glyphosate (Jun et al. 2023). Glyphosate, the active ingredient in weed control brands such as Roundup, has been used for decades, mostly without controversy (Duke 2018). Many farmers attribute their farms' survival to glyphosate. Scientific consensus and fifty years of regulatory scrutiny continue to conclude that glyphosate is a relatively benign chemical, safe for use as directed, and poses next-to-no risk to humans (Solomon 2020). Yet media outlets repeat claims that glyphosate causes everything from autism to cancer to bee extinction. Recently, an article in the prominent medical journal *Pediatrics* recommended that trace dietary exposures should be avoided by children (Abrams et al. 2024).

Why does a disparity exist between evidence and perception and between experts and "experts"? How do we assess the benefits and any potential risks of glyphosate?

What Is Glyphosate?

Glyphosate [N-(phosphonomethyl) glycine] is a nonselective herbicide; in other words, it kills plant species indiscriminately. John Franz, PhD, of the Monsanto Company characterized its herbicidal activity, first on the market as Roundup in 1974. Today, over 750 glyphosate formulations for weed control are produced by numerous companies globally.

Glyphosate kills plants by interfering with 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS), an enzyme essential for production of key amino acids (Duke 2018). Without these amino acids, proteins cannot be synthesized, and the plant dies. All plants have this biochemical pathway, explaining glyphosate's broad toxicity. Glyphosate has no direct pharmacological effects on animals (including humans), which lack this enzyme. Dozens of international regulatory bodies have therefore recognized glyphosate as a low-toxicity chemical with infinitesimal risk to animals at levels encountered (Genetic Literacy Project 2023).

Why was glyphosate widely adopted? Historically, farmers would plant a field of seeds and used cultivation or other herbicides to control weeds. Soil disruption caused topsoil loss from wind and rain and required labor, fuel, and time. Weed control practices radically changed when scientists invented glyphosate-tolerant (GT) crops—available for public use in 1996. Scientists identified a bacterial EPSPS variant that was not impacted by glyphosate and transferred this GT-enzyme into corn, soybeans, sugar beets, canola, and alfalfa. These plants then possessed EPSPS unaffected by glyphosate, so weed control could be accomplished with this singular herbicide (Duke and Powles 2008).

Ease of use, broad spectrum weed control, low cost, minimal environmental impacts, and limited risk to applicators made glyphosate an obvious choice to protect crops from weeds that compete for soil resources. See Figure 1 on the next page.

Legitimate Glyphosate Risks

While glyphosate has low acute toxicity to nontarget organisms, like with anything, risks can exist at excessive exposures. The 50 percent lethal dose is 5,000 mg/kg body weight (Turkmen and Dogan 2020), meaning a 220-pound person would have to consume 500 grams of pure glyphosate to reach that level. While rare reports of self-harm from intentional ingestion of glyphosate exist (Lee et al. 2000), it remains an uncommon cause of human toxicity, certainly not via food or farming exposures.

A primary environmental concern is the emergence of glyphosate-tolerant weeds (Perotti et al. 2020). Much like antibiotic overuse selecting for bacteria able to survive *those* chemicals, weed species have similarly adapted. Over forty-eight weed species have developed mechanisms to survive in the presence of glyphosate since use on genetically engineered crops began in 1996 (Baek et al. 2021). This required companies that produce GT seeds to incorporate additional herbicides in crop management, not ideal when these technologies aim to minimize herbicide use and environmental impact.

Concerns about glyphosate-based herbicide use around aquatic environments are irrespective of glyphosate itself (Tresnakova et al. 2021). Herbicides are applied with a surfactant, a soapy chemical that improves plant tissue penetration. Surfactants break surface tension of water and can themselves

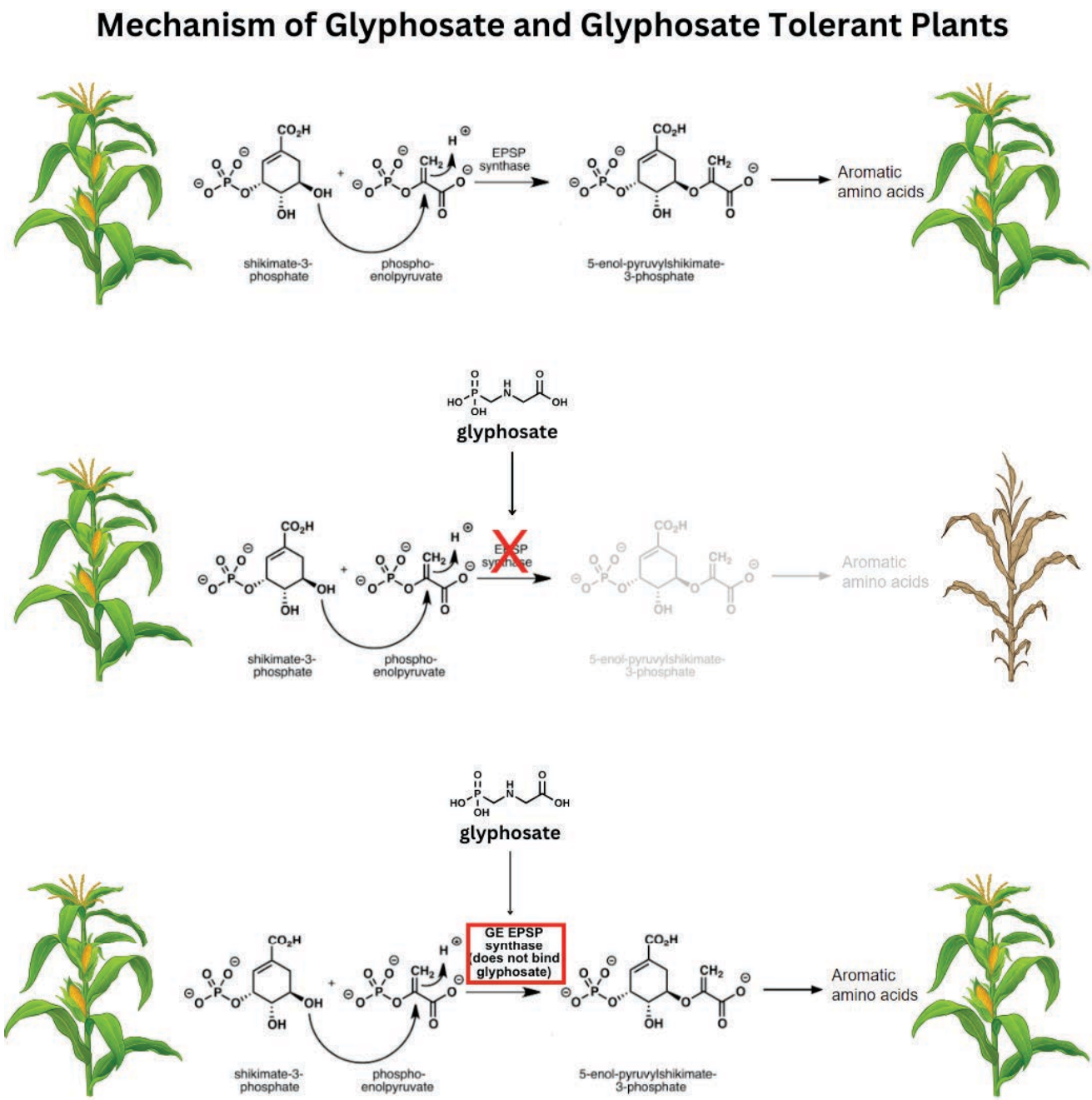


Figure 1. Mechanism of action of glyphosate, wild-type EPSPS, and GT-tolerant EPSPS gene. Created by Andrea Love and Kevin Folta.

pose a risk to microbial communities, insects, and even fish in aquatic ecosystems (Annett et al. 2014; Relyea 2018). Because nontarget plants such as duckweed and other sentinel species may be impacted, glyphosate use is restricted around water environments.

When used appropriately with real-world doses, glyphosate poses little risk to the applicator, consumer, or environment as demonstrated with over fifty years of use in farm and residential applications.

Glyphosate Exposure in Humans

Human exposure to glyphosate is physiologically insignificant. Claims that insinuate human risk from glyphosate are based on infinitesimal levels detected on foods or in urine (Zoller et al. 2020). This underscores a fundamental challenge when discussing pesticides—detection doesn't equal harm. Every chemical has a toxicity threshold dependent on dose. Pesticides might be detected in food at levels measurable only by the most sensitive analytical chemistry tools. We can detect levels of substances that are irrelevant to our health, measures in parts per billion or parts per trillion. A part per billion (ppb) equals fifty drops of water in an Olympic-sized swimming pool, or one second of time in 31.7 years. A part per trillion (ppt) equals one drop of water in twenty Olympic-size swimming pools, or one second of time in 31,700 years.

Glyphosate exposure levels (maximum residue limits, or

MRLs) are set and routinely reevaluated by international agencies to ensure farmer compliance and minimal exposure. For added safety, MRLs are set orders of magnitude below levels that would pose theoretical risks to consumers and account for sensitive populations—children, pregnant women, and those with higher exposure (e.g., farmers) (Winter 2015). The MRL for glyphosate varies by the crop, but ranges from 0.1 to 400 parts per million (ppm) per day (Vicini et al. 2021). Detected levels routinely cited in anti-glyphosate campaigns are far lower than these MRL values.

What levels are humans actually exposed to? The water solubility of glyphosate ensures it is rapidly excreted in urine and stool, making exposure analysis routine with proper instrumentation. A commonly cited paper in opposition to glyphosate found median glyphosate levels in urine are not only miniscule but nearly identical between people who consume conventional or organic food, 390 ppt versus 400 ppt, respectively (Ospina et al. 2022). A review of the literature reports urine levels ranging from 260 ppt to 73.5 ppb (Gillezeau et al. 2019). For reference, 400 ppm, the highest MRL level of glyphosate, is equal to 40,000 ppb or 400,000,000 ppt. *Levels detected in urine are up to a million times lower than the already conservative maximum residue limits*, confirming dietary exposure does not pose even a theoretical health risk.

Sensational Unsupported Claims

Glyphosate remains a staple on many farms, so media outlets, activist groups, and even some scientific journals continue to allude to the dangers of crops "doused in Roundup." In 2012, a credible scientific journal published a paper by G.E. Seralini and coauthors demonstrating that rats fed glyphosate developed tumors. Deeper inspection revealed the authors used a statistically small number of a strain of rats prone to tumor growth, and control rats also developed tumors (Arjó et al. 2013; Sánchez and Parrott 2017). The paper was retracted by the journal, then later appeared in a new journal without changes or additional review in 2014. The European Union sponsored three independent follow-up studies that failed to replicate the original claim (Steinberg et al. 2019; Zeljenková et al. 2016; Coumoul et al. 2019).

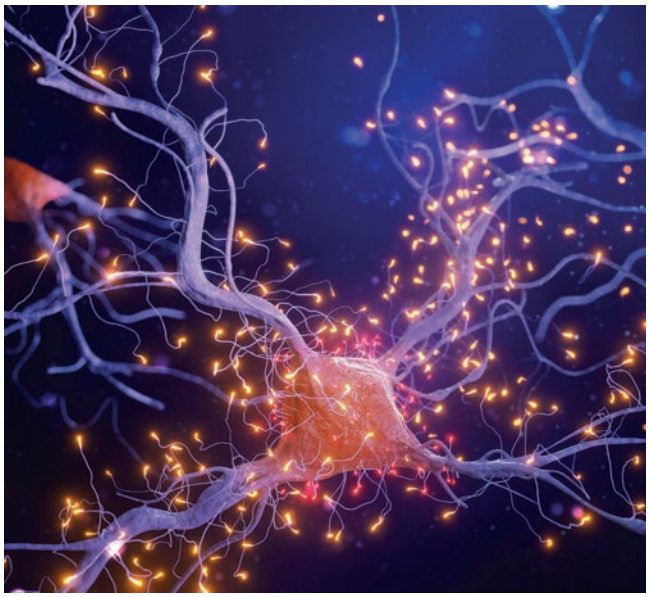
Around the same time, an "independent researcher" and an MIT researcher in artificial intelligence published several reviews in low-quality journals with no original research. The reviews contain an incredible cherry-picking and citation bias, selectively using slivers of data from original research that supports the authors' narrative. One paper, "Glyphosate, Pathways to Modern Diseases II" (Samsel and Seneff 2013) and "Glyphosate, Pathways to Modern Diseases III" (Samsel and Seneff 2015a) suggested glyphosate is the cornerstone of gluten intolerance, infertility, miscarriages, birth defects, kidney failure, cancer, and a spate of other disorders. These claims arise from misinterpretation of correlative data related to glyphosate use and Parkinson's disease, thyroid cancer, and end-stage renal disease. In a subsequent review, they link glyphosate to autism, chronic fatigue, depression, Parkinson's disease, and prion disease (Samsel and Seneff 2015b). They posit glyphosate is in vaccines and underlies an increase in autism (Beecham and Seneff 2016), claiming that glyphosate exposure will cause 50 percent of children to be autistic by 2025 (Faria 2015).

The origin of the glyphosate in vaccines claim was Moms Across America, an organic food activist group with a history of publishing false or doctored information. A nonpeer-reviewed online newsletter shows they contracted a laboratory to perform measurements and claimed to have detected glyphosate in vaccines (Honeycutt 2016). They amplified claims made by U.S. Public Interest Research Group (PIRG) that glyphosate was in wine, beer (Cook and U.S. PIRG Education Fund 2019) and breast milk (Honeycutt 2014). The problem? The commercial kit used is extremely sensitive but validated for use only with water and urine. Breast milk, vaccines, wine, and beer are complex solutions containing countless molecules that could elicit false positive results. Properly executed follow-up work on breast milk failed to detect glyphosate (McGuire et al. 2016; Steinborn et al. 2016), and 95 percent of wine samples contained less than 5 ppb glyphosate (Pérez-Mayán et al. 2022). Glyphosate is used to control weeds in vineyards, but not applied to grapes or grapevines, so detection of trace residues is not unexpected.

Glyphosate was also implicated in chronic kidney disease of unknown origin (CKDu) based solely on correlations (Ulrich et al. 2023). Glyphosate is used to control weeds on tea plantations in Sri Lanka. When farm workers started presenting with an unusual kidney disorder, an investigating medical researcher mentioned glyphosate as a hypothetical cause in a review article (Jayasumana et al. 2014). Social media instantly transformed this guess into gospel, despite no causal evidence of it causing kidney disease. This led to a glyphosate ban in Sri Lanka, increasing production costs for farmers and contributing to food shortages (Marambe and Herath 2020; Dorlach and Gunasekara 2023).

A July 2022 report insinuated that glyphosate causes Alzheimer's disease. The claim exaggerated preclinical research assessing glyphosate in rodents (Winstone et al. 2022). The authors demonstrated that glyphosate consumed by mice was detectable in the brain and corresponded with increased expression of neural inflammation biomarkers. The university communications group wildly extrapolated that to insinuate a link with Alzheimer's disease, which anti-biotechnology groups were quick to amplify. Public communications neglected to mention the mice were fed massive doses of glyphosate daily for two weeks before the assessment, levels that could never be encountered without chugging concentrated herbicide.

These are a sample of how, by accident or design, peer-reviewed literature appears to validate unfounded risks associated with glyphosate. Legitimate findings were exaggerated to alarming absurdity by clickbait headlines and class-action attorneys ready to cash in on a manufactured crisis. There are several individuals with academic credentials misinforming conferences and publishing unsubstantiated associations between glyphosate and every disease or disorder that plagues



us. It is these sensational stories that skew public perception, cause health anxiety, and create a disinformation landscape around one of agriculture's safest chemistries.

Cancer and the IARC Classification

Activists opposed to biotech crops switched their focus from the crops to the chemistries used on them—and glyphosate was the perfect villain. As acres of glyphosate tolerant crops expanded, so did the use of glyphosate, making it easy to hint at correlations between the disease-of-the-day and increased glyphosate use.

This controversy was borne out of slight, statistically non-significant associations between certain cancers in farmers that used glyphosate and some *in vitro* and animal studies. This was enough for the International Agency for Research on Cancer (IARC), a working group of the World Health Organization (WHO), to label glyphosate as a "probable" carcinogen in 2015. This ignited a firestorm of litigation against Bayer, one of many glyphosate manufacturers. Juries, swayed by emotions and legal narratives instead of science, ruled in favor of the plaintiff's cases—reinforcing false associations to cancer and making it more challenging for credible science to prevail in public discussion.

The issue with a "probable carcinogen" classification? The IARC does not assess risk of exposure, only hazard—which does not consider dosage. This means the question IARC is asking is "Could glyphosate theoretically cause cancer under any circumstance?" and not "Is there evidence of a realistic likelihood that glyphosate causes cancer based on exposures humans may encounter?" The IARC monograph did not suggest a link between dietary glyphosate exposure and cancer. Leaked drafts indicated IARC specifically omitted human evidence that did not support the hypothesis of carcinogenicity. These data were present in draft documents, yet were deleted from the final monograph.

The IARC report augmented deep divisions between scientific and agricultural communities and the public, exacerbated by additional flawed reports shared widely. One meta-analysis exploded across the internet, claiming a 41 percent increase in non-Hodgkin's lymphoma in exposed groups (Zhang et al. 2019). However, critics noted the curious grouping of data that led to positive associations (Kabat et al. 2021), and parallel analyses showed no association (Donato et al. 2020). Even a decade after the IARC classification, there is thin epidemiological or mechanistic evidence to support a relationship between glyphosate exposure and any human cancers.

International regulatory bodies that do assess risk and included robust epidemiological studies in their assessment have independently concluded there is no relationship between glyphosate and cancer. These include the Joint FAO/WHO Meeting on Pesticide Residues (JMPR; Food & Agriculture/World Health Organization), the U.S. Environmental Protection Agency (EPA), The National Academies of Sciences (NAS), the European Food Safety Authority (EFSA), the European Chemicals Agency, and Health Canada. All evaluated hundreds of studies across decades of data and concluded there is no solid evidence of glyphosate causing cancer in humans. EFSA rebuked the IARC classification as inappropriate based on data. The European Commission reapproved glyphosate for use until 2033.

A Toolkit for Ten Common Claims about Glyphosate

A well-funded and motivated disinformation enterprise bombards social media with glyphosate claims. Here are rebuttals:

1. "Its use has increased massively." It is true the raw kilograms of herbicide applied internationally have increased significantly since 1996. Before 1996, it was used as a general herbicide. After 1996, it was used to weed massive expanding acreage of genetically engineered crops. But it replaced other herbicides that carried more risk to humans and environment (Duke et al. 2012), meaning a net gain in safety and environmental stewardship.
2. "It has been 'detected' in [insert food, drink, or body fluid here]." Modern analytical chemistry is incredibly sensitive and allows glyphosate to be detected down to the parts per trillion (one second in 31,700 years). Detection does not equal risk; with everything, the dose makes the poison.
3. "Crops are doused in glyphosate." Farmers apply about 750 ml of active ingredient per acre early in plant development. *That's roughly two soda cans per football field.* Not only are crops not "doused," the herbicide is sprayed on herbicide-tolerant plants long before the corn, soybeans, or canola seeds are on the plant.
4. "It caused [problem x] in rats." There are animal studies that show evidence of harm. However, these studies typically administer massive amounts over long periods of time, and rodents have very different physiologies than humans. Be sure to check the dose and research model when vetting claims.
5. "It causes cancer." There has never been definitive, reproducible data suggesting any link to human cancers. The

IARC categorization of "probable carcinogen" is a hazard assessment based on a small number of suggestive animal and petri dish studies. In the almost ten years since the IARC reclassification, there is no sound epidemiological or mechanistic evidence of causality.

6. "It is linked to [insert disease, disorder, or condition here]." Claims that it is "linked" to cancer, autism, etc., should raise skeptical red flags. In this context, a "link" can be a one-off paper, retracted study, weak statistical blip, or rangy correlation. A link does not mean actual risk. Many anti-glyphosate organizations will show correlations between a given disease and use of the herbicide in total kilograms. Correlation does not equate to causation. It is important to note that in fifty years of use, research, and international regulatory scrutiny, no disease has been shown to be causally associated with occupational or dietary exposure.
7. "It causes digestive problems when sprayed to dry wheat." Occasionally, grain crops are treated with glyphosate to ensure the product, typically wheat, dries uniformly. Claims that this causes gluten sensitivity, "leaky gut," and other nebulous medical conditions are unfounded. Glyphosate does not "alter" gluten structure as is sometimes claimed, and levels of glyphosate found on wheat products are too low to even hypothetically cause these issues.
8. "It destroys the microbiome." *In vitro* experiments and *in silico* projections suggest that glyphosate might inhibit favorable bacteria while elevating harmful bacteria in the intestine. Aside from the fact that *in vitro* studies cannot recapitulate the complexity of the human digestive system, trace levels of glyphosate consumed are too low to cause these issues, especially because bacteria do not take up glyphosate well without additional surfactants.
9. "It is killing bees." Bees visit flowers. Plants sprayed with glyphosate either do not flower or flowers rapidly die. The exceptions are genetically engineered crops such as canola that flower and attract bees. However, residues present in nectaries and pollen range from "below detection" to 205 ppb, a level unlikely to cause harm, and is undetectable two months following application (Zioga et al. 2022). Bees fed higher chronic exposures in the laboratory at 2.5 ppm have shown some effects on foraging behaviors (Farina et al. 2019). Others fed 5–10 ppm in sugar water for five days showed negative effects on microbiome composition (Motta et al. 2018). High concentrations used were designed to mimic those in recent applications (Motta and Moran 2023), so data must be considered with that caveat.
10. "Look at the lawsuits: RoundUp causes cancer." Monsanto (now Bayer) has both lost and won court cases. Lawsuits and jury trials are not scientific evidence of health effects, merely evidence that a jury was persuaded by a convincing (i.e., emotional) appeal. Anyone can sue anyone for anything, and juries are not inherently scientific experts. This is a red herring that ignores fifty years of scientific evidence.

Conclusions

Modern agriculture seeks to fill gaps in food security, reinforcing and improving human health. A new eye on sustainability welcomes new (and occasionally old) technology to make land use more efficient and lessen environmental impact. With intrinsic concerns of health, safety, environmental stewardship, and farmers' economic sustainability, glyphosate has met these goals for five decades. While there is insufficient evidence of health impacts at current exposures, use has been and will continue to be monitored closely. Ongoing research should continue to be alert for any actual risk, perhaps in certain population segments. As of the writing of this article, glyphosate remains useful for farmers to ensure productivity, affordability, and stability of food crops. Although it remains a political target, our job as a scientific and skeptical community is to continue to evaluate claims for veracity and clearly communicate actual risk and benefits to the public. ■

References

Abrams, Steven A., Jaclyn Lewis Albin, and Philip J. Landrigan. 2024. Use of genetically modified rganism (GMO)–containing food products in children. *Pediatrics* 153(1): e2023064774.

Annett, Robert, Hamid R. Habibi, and Alice Hontela. 2014. Impact of glyphosate and glyphosate-based herbicides on the freshwater environment. *Journal of Applied Toxicology* 34(5): 458–479. Online at https://doi.org/10.1002/jat.2997.

Arjó, Gemma, Manuel Portero, Carme Piñol, et al. 2013. Plurality of opinion, scientific discourse and pseudoscience: An in depth analysis of the Séralini et al. study claiming that Roundup™ Ready corn or the herbicide Roundup™ cause cancer in rats. *Transgenic Research*: 1–13.

Baek, Yousoon, Lucas K. Bobadilla, Darci A. Giacomini, et al. 2021. Evolution of glyphosate-resistant weeds. In *Reviews of Environmental Contamination and Toxicology, Vol 255: Glyphosate*, edited by James B. Knaak. Cham, CH: Springer International Publishing, 93–128.

Beecham, James E., and Stephanie Seneff. 2016. Is there a link between autism and glyphosate-formulated herbicides? *Journal of Autism* 3(1): 1.

Cook, Kara, and U.S. PIRG Education Fund. 2019. Glyphosate pesticide in beer and wine. Washington, DC: U.S. PIRG Education.

Coumoul, Xavier, Rémi Servien, Ludmila Juricek, et al. 2019. The GMO90+ project: Absence of evidence for biologically meaningful effects of genetically modified maize-based diets on Wistar rats after 6-months feeding comparative Trial. *Toxicological Sciences* 168(2): 315–338.

Donato, Francesca, Enrico Pira, Catalina Ciocan, et al. 2020. Exposure to glyphosate and risk of non-Hodgkin lymphoma and multiple myeloma: An updated meta-analysis. *La Medicina del Lavoro* 111(1): 63.

Dorlach, Tim, and Sandya Gunasekara. 2023. The politics of glyphosate regulation: Lessons from Sri Lanka's short-lived ban. *Globalization and Health* 19(1): 84. Online at https://doi.org/10.1186/s12992-023-00981-2.

Duke, Stephen O. 2018. The history and current status of glyphosate. *Pest Management Science* 74(5): 1027–1034. Online at https://doi.org/https://doi.org/10.1002/ps.4652.

Duke, Stephen O., John Lydon, William C. Koskinen, et al. 2012. Glyphosate effects on plant mineral nutrition, crop rhizosphere microbiota, and plant disease in glyphosate-resistant crops. *Journal of Agricultural and Food Chemistry* 60(42): 10375–10397. Online at https://doi.org/10.1021/jf302436u.

Duke, Stephen O., and Stephen B. Powles. 2008. Glyphosate: A once-in-a-century herbicide. *Pest Management Science* 64(4): 319–325. Online athttps://doi.org/10.1002/ps.1518.

Faria, Miguel A. 2015. Glyphosate, neurological diseases–and the scientific method. *Surgical Neurology International* 6.

Farina, Walter M., M. Sol Balbuena, Lucila T. Herbert, et al. 2019. Effects of the herbicide glyphosate on honey bee sensory and cognitive abilities: Individual impairments with implications for the hive. *Insects* 10(10): 354.

Genetic Literacy Project. 2023. What do global regulatory agencies conclude about the health impact of glyphosate? Online at https://geneticliteracyproject.org/wp-content/uploads/2019/03/Glyphosate_Infographic_GLP.pdf.

Gillezeau, Christina, Maaike van Gerwen, Rachel M. Shaffer, et al. 2019. The evidence of human exposure to glyphosate: A review. *Environmental Health* 18(1): 2. Online at https://doi.org/10.1186/s12940-018-0435-5.
Honeycutt, Z. 2014. Glyphosate testing full report: Findings in American mothers' breast milk, urine and water glyphosate in childhood vaccines. Moms Across America (April 7). Online at https://www.momsacrossamerica.com/glyphosate_testing_results.
———. 2016. Glyphosate in childhood vaccines. Moms Across America (September 10). Online at https://www.momsacrossamerica.com/glyphosate_in_childhood_vaccines.
Jayasumana, Channa, Sarath Gunatilake, and Priyantha Senanayake. 2014. Glyphosate, hard water and nephrotoxic metals: Are they the culprits behind the epidemic of chronic kidney disease of unknown etiology in Sri Lanka? *International Journal of Environmental Research and Public Health* 11(2): 2125–2147.
Jun, Inyoung, Zheng Feng, Raghavendhran Avanasi, et al. 2023. Evaluating the perceptions of pesticide use, safety, and regulation and identifying common pesticide-related topics on Twitter. *Integrated Environmental Assessment and Management* 19(6): 1581–1599. Online athttps://doi.org/10.1002/ieam.4777.
Kabat, Geoffrey C., William J. Price, and Robert E. Tarone. 2021. On recent meta-analyses of exposure to glyphosate and risk of non-Hodgkin's lymphoma in humans. *Cancer Causes & Control* 32: 409–414.
Lee, Hsin-Ling, Kuan-Wen Chen, Chih-Hsien Chi, et al. 2000. Clinical presentations and prognostic factors of a glyphosate—surfactant herbicide intoxication a review of 131 cases. *Academic Emergency Medicine* 7(8): 906–910.
Marambe, Buddhi, and Swarna Herath. 2020. Banning of herbicides and the impact on agriculture: The case of glyphosate in Sri Lanka. *Weed Science* 68(3): 246–252. Online at https://doi.org/10.1017/wsc.019.71.
McGuire, Michelle K., Mark A. McGuire, William J. Price, et al. 2016. Glyphosate and aminomethylphosphonic acid are not detectable in human milk. T*he American Journal of Clinical Nutrition* 103(5): 1285–1290.
Motta, Erick V.S., and Nancy A. Moran. 2023. The effects of glyphosate, pure or in herbicide formulation, on bumble bees and their gut microbial communities. *Science of the Total Environment* 872: 162102. Online at https://www.sciencedirect.com/science/article/pii/S0048969723007180.
Motta, Erick V.S., Kasie Raymann, and Nancy A. Moran. 2018. Glyphosate perturbs the gut microbiota of honey bees. Proceedings of the National Academy of Sciences 115(41): 10305–10310.
Ospina, Maria, Andre Schütze, Pilar Morales-Agudelo, et al. 2022. Exposure to glyphosate in the United States: Data from the 2013–2014 National Health and Nutrition Examination Survey." *Environment International* 170: 107620. Online at https://www.sciencedirect.com/science/article/pii/S0160412022005475.
Pérez-Mayán, L., G. Castro, M. Ramil, et al. 2022. Approaches to liquid chromatography tandem mass spectrometry assessment of glyphosate residues in wine. *Analytical and Bioanalytical Chemistry* 414(3): 1445–1455. Online at https://doi.org/10.1007/s00216-021-03775-w.
Perotti, Valeria E., Alvaro S. Larran, Valeria E. Palmieri, et al. 2020. Herbicide resistant weeds: A call to integrate conventional agricultural practices, molecular biology knowledge and new technologies. P*lant Science* 290: 110255. at https://www.sciencedirect.com/science/article/pii/S0168945219300585.
Relyea, Rick A. 2018. The interactive effects of predator stress, predation, and the herbicide Roundup. *Ecosphere* 9(11): e02476.
Samsel, Anthony, and Stephanie Seneff. 2013. Glyphosate, pathways to modern diseases II: Celiac sprue and gluten intolerance. *Interdisciplinary Toxicology* 6(4): 159.
——. 2015a. Glyphosate, pathways to modern diseases III: Manganese, neurological diseases, and associated pathologies. *Surgical Neurology International* 6.
——. 2015b. Glyphosate, pathways to modern diseases IV: Cancer and related pathologies. *The Journal of Biological Physics and Chemistry* 15: 121–159.
Sánchez, Miguel A., and Wayne A. Parrott. 2017. Characterization of scientific studies usually cited as evidence of adverse effects of GM food/feed. *Plant Biotechnology Journal* 15(10): 1227–1234. Online at https://doi.org/10.1111/pbi.12798.
Solomon, Keith R. 2020. Estimated exposure to glyphosate in humans via environmental, occupational, and dietary pathways: An updated review of the scientific literature. *Pest Management Science* 76(9): 2878–2885. Online at https://doi.org/10.1002/ps.5717.
Steinberg, Pablo, Hilko van der Voet, Paul W. Goedhart, et al. 2019. Lack of adverse effects in subchronic and chronic toxicity/carcinogenicity studies on the glyphosate-resistant genetically modified maize NK603 in Wistar Han RCC rats. *Archives of Toxicology* 93(4): 1095–1139.
Steinborn, Angelika, Lutz Alder, Britta Michalski, et al. 2016. Determination of glyphosate levels in breast milk samples from Germany by LC-MS/MS and GC-MS/MS. *Journal of Agricultural and Food Chemistry* 64(6): 1414–1421.
Tresnakova, Nikola, Alzbeta Stara, and Josef Velisek. 2021. Effects of glyphosate and its metabolite AMPA on aquatic organisms. *Applied Sciences* 11(19): 9004.
Turkmen, Ruhi, and Ilkay Dogan. 2020. Determination of acute oral toxicity of glyphosate isopropylamine salt in rats. Environmental Science and Pollution Research 27(16): 19298–19303. Online at https://doi.org/10.1007/s11356-020-07643-5.
Ulrich, Jake C., Kate Hoffman, Tdksc Gunasekara, et al. 2023. Glyphosate and fluoride in high-hardness drinking water are positively associated with chronic kidney disease of unknown etiology (CKDu) in Sri Lanka. Environmental Science & Technology Letters 10(10): 916–923.
Vicini, John L., Pamela K. Jensen, Bruce M. Young, et al. 2021. Residues of glyphosate in food and dietary exposure. Comprehensive Reviews in Food Science and Food Safety 20(5): 5226–5257. Online at https://doi.org/10.1111/1541-4337.12822.
Winstone, Joanna K., Khyatiben V. Pathak, Wendy Winslow, et al. 2022. Glyphosate infiltrates the brain and increases pro-inflammatory cytokine TNFα: Implications for neurodegenerative disorders. *Journal of Neuroinflammation* 19(1): 193.
Winter, Carl K. 2015. Chronic dietary exposure to pesticide residues in the United States. International *Journal of Food Contamination* 2(1): 11. Online at https://doi.org/10.1186/s40550-015-0018-y.
Zeljenková, Dagmar, Radka Aláčová, Júlia Ondrejková, et al. 2016. One-year oral toxicity study on a genetically modified maize MON810 variety in Wistar Han RCC rats (EU 7th Framework Programme project GRACE). Archives of Toxicology 90(10): 2531–2562.
Zhang, Luoping, Iemaan Rana, Rachel M. Shaffer, et al. 2019. Exposure to glyphosate-based herbicides and risk for non-Hodgkin lymphoma: A meta-analysis and supporting evidence. Mutation Research/Reviews in Mutation Research 781: 186–206.
Zioga, Elena, Blánaid White, and Jane C. Stout. 2022. Glyphosate used as desiccant contaminates plant pollen and nectar of non-target plant species. *Heliyon* 8(12).
Zoller, Otmar, Peter Rhyn, Jürg A. Zarn, et al. 2020. Urine glyphosate level as a quantitative biomarker of oral exposure. International *Journal of Hygiene and Environmental Health* 228: 113526.

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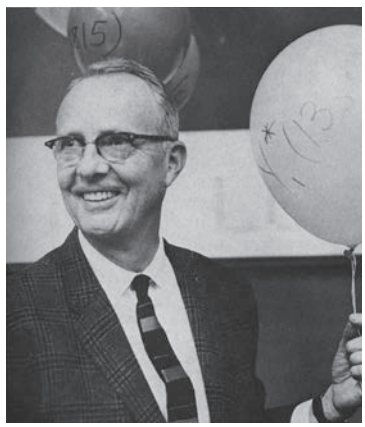
Luis W. Alvarez and the Case of the Curious Coincidences

ALEC NEVALA-LEE

In 1965, physicist Luis W. Alvarez happened to see a newspaper article that led him to remember pianist Joe Sanders "very probably for the first time in thirty years." Less than five minutes later, he turned to the obituaries, where he saw a short item about a musician who had died the previous Friday. It was Joe Sanders.



Alvarez winning Nobel Prize in 1968.

Alvarez later compared this incident to accounts from "the popular literature of parapsychology." A subject might dream about a friend, for instance, only to be awakened by a phone call with news of that person's death. As he pondered this apparent mystery, he saw that it came down to a simple question: What were the odds that he would randomly remember Joe Sanders and then hear about his death within the next five minutes? To simplify matters, he assumed that he would think about Sanders precisely once—no more, no less—in thirty years and that he was equally certain to learn of his death at some point during that period. There was a single window of opportunity when the latter could come immediately after the former: the five minutes before he learned that Sanders was dead. And it could occur only once in that thirty-year timeframe.

This meant that the probability he would think of Sanders, purely by chance, at exactly the right time was in the ballpark of $5/(525{,}600 \times 30)$, or around 3×10^{-7}. Such a coincidence would be equally surprising if it involved anyone at all, not just Sanders, so Alvarez multiplied this probability by the number of living people whose names he might recognize, estimating that it consisted of approximately 3,000 "known persons." The odds of remembering one of them just before hearing about their death were roughly 10^{-3}—or 1 in 1,000—over thirty years.

But the real question was how likely this would be to happen to *anyone*, not just Alvarez. Taking the adult population of the United States as 100,000,000 at the time, he calculated that ten such coincidences would occur in America each day. ("For the average person 3,000 recognizable names is probably an overestimate," he noted, "but the postulated single recollection in thirty years is certainly much too low. These two departures from realistic assumptions have opposite effects on the computed rate, so ten per day is still a reasonable estimate." It was a lovely example of a Fermi problem, an educated "guesstimate" in which any errors tended to cancel each other out.)

Alvarez concluded that such incidents were frequent enough to fill plenty of books on the paranormal. In a letter in the June 18, 1965, issue of *Science*, he wrote, "With such a large sample to draw from, it is not surprising that some exceedingly astonishing coincidences are reported in the parapsychological literature as proof of extrasensory perception." But not everyone granted this point. Two months later, the journal published a rebuttal from famous parapsychologist J.B. Rhine, who thought that Alvarez had been unfair.

Rhine argued that no reputable researcher would waste time on anecdotal reports. In forty years, he said, "I have not come upon any attempt to base a serious conclusion upon spontaneous case material." Alvarez decided to check for himself. At the library, it took him just five minutes to find a paper in *The International Journal of Parapsychology* that advised experimenters to investigate "spontaneous cases," which were "a natural phenomenon to be studied by appropriate research methods." In a followup letter to *Science*, Alvarez wrote that "luck" might explain how he found this counterexample so quickly, but he refrained from mentioning the most amusing coincidence of all. The author of the article was Louisa E. Rhine—J.B. Rhine's wife. ■

Note

While writing my recent biography of Alvarez, who won the Nobel Prize in 1968, I found that he was drawn to debunking extraordinary claims related to topics such as UFOs, the pyramids, and John F. Kennedy's assassination. In 1983, he politely declined an invitation to join the Committee for the Scientific Investigation of Claims of the Paranormal, explaining he only lent his name to organizations in which he could take a more active role, but he wrote back, "I'll be on the sidelines, cheering you on."

Alec Nevala-Lee is the author of ***Collisions: A Physicist's Journey from Hiroshima to the Death of the Dinosaurs***, the first comprehensive biography of Luis W. Alvarez (published by W.W. Norton).

New Research Shows Cognitive Inoculation Improves Discernment of Misinformation

SANDER VAN DER LINDEN, ALMOG SIMCHON, AND STEPHAN LEWANDOWSKY

The spread of misinformation is threatening public health and the future of our democracies. But amid the flood of falsehoods and AI-generated propaganda, some commentators have expressed concern that all this talk about misinformation will simply lead people not to believe anything anymore. Indeed, there is a crucial difference between the professional true Skeptic who is open-minded and able to carefully discern between fact and fiction and a more nihilistic attitude characterized by a pessimistic tendency to doubt and scoff at simply everything. Philosopher Massimo Pigliucci described this fine distinction in Skeptical Inquirer as "capital-S" skepticism versus "lowercase-s" skepticism. He wondered if current approaches to fight misinformation are simply landing on deaf ears, generating more "skepticism" rather than true *Skepticism* (Pigliucci 2023).

Philosopher and psychologist William James famously described this tension as one between "knowing the truth" and "avoiding error" (James 1894). In other words, an extreme focus on *error avoidance* minimizes the risk of believing falsehoods but may cause someone to miss out on important potential truths, whereas an extreme focus on *truth attainment* might lead someone to accept far too many claims, including harmful falsehoods. The question therefore is whether popular misinformation interventions focus too much on error avoidance (van Doorn 2023).

A prime example is psychological inoculation, or "prebunking," a popular intervention to counter misinformation that has been adopted by governments, public health authorities, and technology companies (see van der Linden 2023; Lewandowsky and van der Linden 2021). Inoculation leverages the old wisdom that prevention is better than cure, especially in the context of exposure to misinformation. The theory takes its namesake from the biomedical analogy: vaccines introduce a weakened strain of a pathogen into the body to trigger the production of antibodies to confer resistance against future infection. So too can minds become inoculated against misinformation via exposure to severely weakened doses of the techniques used to produce it along with clear guidance on how to spot and neutralize misleading rhetoric. Much empirical research using a variety of interventions, from entertaining games to text and videos, has found support for the approach (Lewandowsky and van der Linden 2021), including real-world tests on social media (Roozenbeek et al. 2022).

Yet some critics have suggested that this research has not sufficiently disentangled how such interventions impact people's "truth attainment" versus "error avoidance" strategies. Perhaps inoculation causes people to just focus on errors (i.e., manipulative rhetoric) too much, at the expense of missing out on true or credible information.

Luckily, in the 1950s and 1960s, research in psychophysics pioneered a new mathematical framework to disentangle truth attainment and error avoidance strategies, known as signal detection theory (Wixted 2020). Signal detection theory allows us to separate out a person's ability to discern between real and fake news (i.e., "discrimination") from their tendency to just say "true" or "false" to everything (i.e., "response bias"). In other words, we want someone to correctly identify manipulation when manipulation is present (*signal*) and accurately recognize the lack of manipulation when manipulation is *absent*. Note that William James recognized early on that these are independent strategies, and so we must balance our search for truth ("hits") against a desire to avoid errors (i.e., minimizing false positives).

In a new preregistered research study (Simchon et al. 2025), we combined signal detection theory with meta-analysis to evaluate how well inoculation interventions help people discern signal from noise. In total, we analyzed thirty-three inoculation experiments representing over 37,000 participants. The results are clear: cognitive inoculation consistently helps people better discern reliable from unreliable news without inducing undue bias or skepticism.

Prior research has often operationalized signal and noise in an overly simplistic (i.e., binary) fashion, but news media is a bit more complicated than that: fake news isn't simply the inverse of true news. Manipulation often occurs on a graded spectrum, so our interventions typically ask people to calibrate their judgments on a graded scale of reliability or trustworthiness. To overcome this problem analytically, we used ordinal regression in the form of Bayesian hierarchical multilevel modeling. Ordinal regression predicts variables that have a natural ordering, for example, a scale that ranges from "very reliable" to "very unreliable." Unlike true/false, this offers a more nuanced approach and allows us to model discrimination and bias parameters separately. The multi-level nature of the model enables pooling of infor-

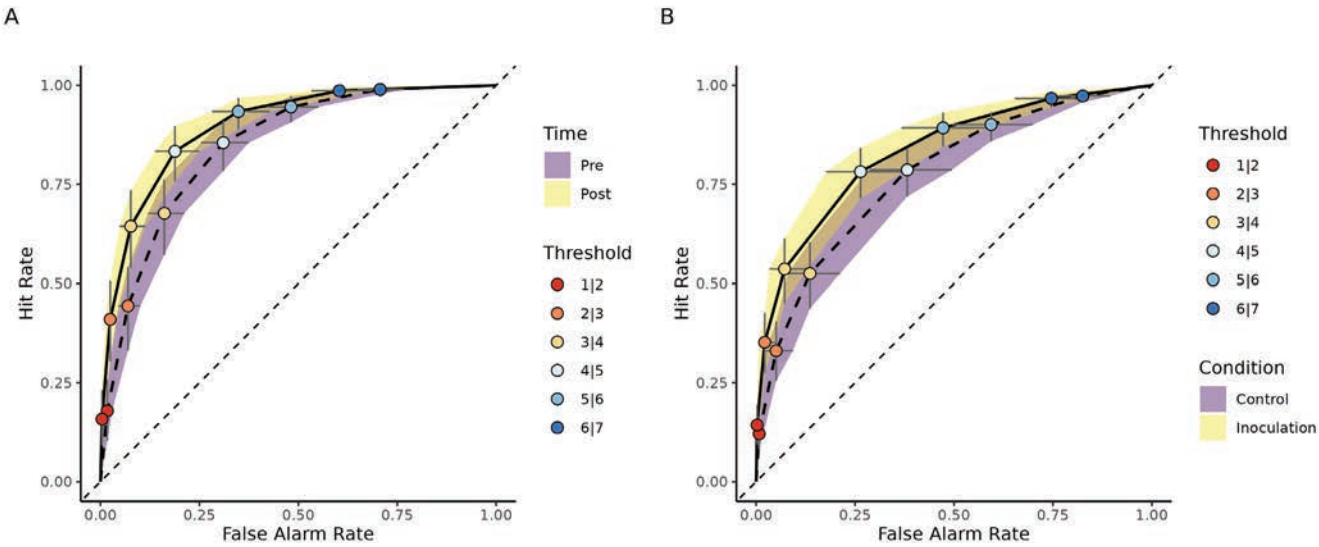


Figure 1. Reprinted with permission from Simchon et al. (2025).

mation across participants and groups, and the Bayesian element helps us quantify uncertainty directly.

The results from our model are plotted in Figure 1 using a receiver operating characteristic (ROC) curve (which dates to World War II, where a "receiver" would try to distinguish between a credible signal, such as an enemy plane, or noise such as birds). It plots the hit rate ("correct identification") on the y-axis against the false alarm rate on the x-axis along the seven-point scale of perceived reliability. So, a "hit" in this context is correctly identifying unreliable content whereas a "false alarm" is saying fake news when the news is in fact credible. What you want to see is that the inoculation intervention (yellow shading) bends more toward the top-left corner compared to the pre-test (purple, panel A) or control condition (purple, panel B). Why? Because the top-left quadrant indicates high hit rates with low false alarm rates, evidencing improved discernment ability so that people accumulate more hits without increasing their false alarms (note that the dashed line represents 50/50 guessing). You can see that the dots on the yellow line, compared to the purple, represent higher hit rates for equivalent false-alarm rates. In other words, people carefully calibrate their judgments post-inoculation without shifting their overall bias to reject or accept all information.

This is good news for both practical and scientific reasons. Practically, this means that journalists, policymakers, educators, and Skeptics can inoculate against misinformation without having to worry about making people lower-s skeptical (or cynical).

Of course, this doesn't mean that inoculation always has the intended impact. It is important to follow evidence-based guidelines, including giving people examples of both manipulation and non-manipulation as part of the inoculation process. But there are also important theoretical implications. Pigliucci (2023) asserts that most misinformation likely doesn't have any "fingerprints" people could learn to detect. If this were true, our interventions could not help people discern better between reliable and unreliable claims. Yet we clearly find the opposite, which strongly implies misinformation has enough snake oil characteristics people can learn to pick up on, including impersonation, polarizing rhetoric, conspiratorial reasoning, and logical fallacies. Bill Nye called for an "aggressive form of critical thinking to immunize us to fakery" (Nye 2017). Inoculation is just that.

True Skeptics update their beliefs in light of new evidence. Here's the evidence. ■

References

James, W. 1894. The will to believe. In *Philosophy of Religion*. Oxfordshire, UK: Routledge, pp. 169–180.

Lewandowsky, S., and S. van der Linden. 2021. Countering misinformation and fake news through inoculation and prebunking. *European Review of Social Psychology* 32(2): 348–384.

Nye, B. 2017. *Everything All at Once: How to Unleash Your Inner Nerd, Tap into Radical Curiosity, and Solve Any Problem*. Emmaus, PA: Rodale.

Pigliucci, M. 2023. Is there a problem with skepticism? Skeptical Inquirer 46(6). Online at https://skepticalinquirer.org/2023/10/is-there-a-problem-with-skepticism/.

Roozenbeek, J., S. van der Linden, B. Goldberg, et al. 2022. Psychological inoculation improves resilience against misinformation on social media. *Science Advances* 8(34): eabo6254.

Simchon, A., T. Zipori, L. Teitelbaum, et al. 2025. A signal detection theory meta-analysis of psychological inoculation against misinformation. *Current Opinion in Psychology* 67: 102194.

Van Doorn, M. 2023. Advancing the debate on the consequences of misinformation: clarifying why it's not (just) about false beliefs. *Inquiry*: 1–27.

Van der Linden, S. 2023. *Foolproof: Why Misinformation Infects Our Minds and How to Build Immunity*. New York, NY: W.W. Norton & Company.

Wixted, J.T. 2020. The forgotten history of signal detection theory. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 46(2): 201–233.

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Response to van der Linden and Colleagues about Cognitive Inoculation Research

MASSIMO PIGLIUCCI

I want to thank Prof. Sander van der Linden and his colleagues for their article on the application of signal detection theory to inoculation research (published in this issue). The approach is methodologically sophisticated, and the results from analyzing thirty-three experiments with over 37,000 participants are indeed promising. The use of ordinal regression and Bayesian hierarchical modeling to separately assess discrimination ability and response bias represents a genuine advance in addressing concerns about whether inoculation interventions might simply make people more cynically dismissive of all information.

The receiver operating characteristic (ROC) curve analysis showing improved discernment without a shift toward blanket rejection is particularly encouraging and speaks directly to the lowercase-s versus capital-S *skepticism* distinction I raised. If these findings hold up across diverse contexts and populations, they would suggest that people can indeed learn to identify manipulative techniques without becoming unduly suspicious of legitimate information—which would be exactly what we capital-S Skeptics should hope for.

That said, I maintain appropriate scientific caution. Research on misinformation interventions must continue to grapple with thorny issues of ecological validity, the complexity of real-world information environments, and the challenge of defining what constitutes "manipulation" in contested domains. The history of psychology reminds us that promising early results don't always translate into robust, generalizable effects. But this is precisely why continued research, replication, and methodological refinement matter.

What I appreciate most about this ongoing exchange is that it exemplifies what capital-S Skepticism should be: a willingness to update our views based on new evidence while maintaining critical scrutiny of methods and interpretations. Van der Linden and his team have taken seriously the conceptual concerns raised and have produced empirical work that directly addresses them. That's how science should work.

Whether or not we ultimately agree on every detail, our shared commitment to evidence-based approaches to combating misinformation unites us in an important cause. Frank but respectful debate strengthens rather than weakens the skeptical movement, and I look forward to seeing how this research program develops.

Van der Linden and Colleagues Reply

We thank Professor Massimo Pigliucci for his thoughtful, well-balanced, and considerate response. We are in full agreement that it is always desirable to get more empirical evidence, particularly in terms of real-world generalizability of psychological interventions and effects. In the context of misinformation, much work remains to be done, and the challenges we face are significant. As Pigliucci points out, the beauty of being capital-S Skeptics is that we don't have to agree on everything, but we can enjoy respectful discussion about evidence-based interventions to help move the field forward. We are grateful for the opportunity and hope readers found this debate as insightful as we did. Perhaps now more than ever, Skeptics are needed to help fight the onslaught of misinformation. ■

To read Massimo Pigliucci's article about lowercase-s skepticism and capital-S Skepticism ("Is There a Problem with Skepticism?"), scan the QR code or visit skepticalinquirer.org

Massimo Pigliucci is the K.D. Irani Professor of Philosophy at the City College of New York. His books include *Nonsense on Stilts: How to Tell Science from Bunk* (Chicago Press) and *Philosophy of Pseudoscience* (coedited with Maarten Boudry, Chicago Press). More by him at https://massimopigliucci.net/.

FUN & GAMES

Edited by Stephen Hupp

YOU CAN FIND THE ANSWERS TO THESE GAMES IN SECRETS REVEALED (P. 66).

WORD NOODLE

Make a new word with the same number of letters
(green = correct letter and position;
yellow = correct letter;
black = wrong letter).

Clue: KENNY Biddle is skeptical that this sound is evidence of a ghost.

Clue: MELANIE Trecek-King's acronym for evaluating claims in a sea of misinformation.

Clue: ZETETIC synonym.

Share how well you did on Bluesky, our new social media platform.

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WHAT'S THE MEANING OF THIS?

Determine the meaning of these letters, numbers, and symbols that relate to science and skepticism. (Note: For the last one, you need to know all six words in the acronym to receive the points.)

		Your Score
π	3 pts.	
D20	20 pts.	
S	32 pts.	
42	42 pts.	
CSICOP	1976 pts.	
	TOTAL:	

CONNECTIVITY

These words can be divided into 3 groups, each with 3 words.

Write your guesses below:

Find Three Groups of Three Connections...

FORD	FOSTER	LOVE
NOTES	RAD	BEHAVIOR
WEST	POSTCARDS	BEN

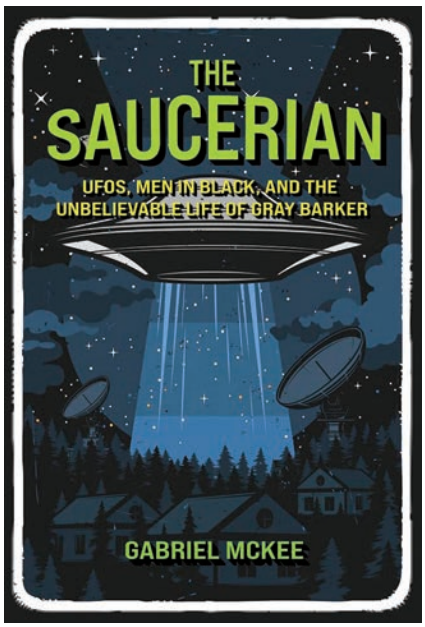
Gray Barker's Legacy: Men in Black, the Philadelphia Experiment, and Mothman

Terence Hines

The name Gray Barker (1925–1984) may not be familiar to many readers of Skeptical Inquirer. In the UFO community of the 1950s and through the 1980s, he was both famous and infamous. As Gabriel McKee clarifies in this excellent biography of Barker, whether he was a believer in the reality (*which* reality?) of UFOs or not is not an easy question to answer. McKee had access to vast amounts of background and archival information on Barker. These sources included considerable correspondence between Barker and many others in the UFO community. The best guess is that Barker's beliefs changed frequently. It remains clear that throughout he maintained a loose relationship with the truth.

In terms of this influence on modern UFOlogy and the wider culture, Barker should be remembered best for the creation of the Men in Black mythos. In 1956, University Press published his *They Knew Too Much about Flying Saucers*, which introduced the idea that if you, well, *knew too much*, mysterious individuals dressed in black would show up and threaten you to stop researching and publishing. This led to a spate of supposedly threatened individuals who promptly continued to, ironically, research and publish—all with no apparent ill effects.

Barker was a prolific writer, editor, and publisher of books and magazines on UFOs and related topics, both by himself and with other authors. In 1958, he founded his own publishing house, Saucerian Books. In 1959, his first title as publisher was *From Outer Space to You* by Howard Menger, an early UFO contactee who became well known in the UFO community claiming that the space people were from Venus. McKee makes an important revelation when he reports that around 1960 on an episode of Long John Nebel's "short-lived television program on WOR-TV, Menger essentially recanted his entire story" (p. 107). This has not been previously known outside of a few obscure flying saucer publications.



The Saucerian: UFOs, Men in Black, and the Unbelievable Life of Gray Barker. By Gabriel McKee. MIT Press, 2025.

The Men in Black was not Barker's only contribution to UFO mythology. "The Philadelphia Experiment" refers to the claim that in 1943 the U.S. Navy successfully teleported an entire destroyer, the *USS Eldridge*, from Philadelphia to Norfolk and back again. In 1963, Barker's Saucerian Press published *The Strange Case of Dr. M. K. Jessup*. This was based on letters Jessup received after his book *The Case for the UFO: Unidentified Flying Objects* (1955) was published by Saucerian. The letters told the story of a seaman on a neighboring ship who claimed to have seen the experiment conducted. The Philadelphia Experiment became a cause celebre in the paranormal community. In 1979, William Moore and Charles Berlitz published *The Philadelphia Experiment: Project Invisibility*, which brought the claim to a wider audience.

Barker was also in at the beginning of the Mothman legend, the appearance of a large unknown flying creature in Point Pleasant, West Virginia, in December 1966. In the legend, the appearance of the Mothman is somehow tied to the collapse of the Silver Bridge in Point Pleasant over the Ohio River in December 1967 in which forty-six people died. Barker investigated the Mothman sighting several months later. In 1970, he published *The Silver Bridge*, a heavily fictionalized account of the collapse of the bridge and its relation to Mothman. For example, McKee recounts that Barker admitted that one chapter was "constructed out of whole cloth" (p. 181), citing a letter from Barker. UFO proponent and writer John Keel (1930–2009) also investigated the Mothman. In the late 1960s, Keel became famous for arguing that the extraterrestrial hypothesis for UFO origins was wrong and that UFOs were the result of some sort of psychic phenomenon or were "extradimensional" entities of some sort. Keel and Barker played humorous tricks on each other during their investigations. Keel went on to publish his own Mothman book, *The Mothman Prophecies*, in 1975. This was the basis for the popular 2002 film of the same name starring Richard Gere and Laura Linney that brought the Mothman to popular attention.

McKee arranges the book chronologically, beginning before Barker became known in the UFO community. The first two chapters provide important background for readers unfamiliar with either Barker specifically or the history of UFOs. The first chapter, "Gray Barker before Flying Saucers," describes his upbringing in rural West Virginia and his early interest in writing and journalism. It was in his early post-college years that his interest in movies set him on a career as a distributor of films to regional drive-in theaters and sometimes owner of such theaters. It was this occupation that supported his writing and publications about flying saucers.

The second chapter, "Flying Saucers before Gray Barker," summarizes the state of the UFO culture starting with Kenneth Arnold's famous 1947 sighting. In the 1950s, there were several flying saucer organizations. In 1952, the International Flying Saucer Bureau (IFSB) was formed by Albert Bender, with whom Barker worked for many years. The IFSB organized a "World Contact Day," March 15, 1953, during which members sent psychic messages to UFO occupants inviting them to contact Earth. The IFSB didn't last long but lives on in song, because their psychic message started "Calling occupants of interplanetary craft." This inspired the Carpenter's 1977 song of that name, although the Canadian group Klaatu recorded it first in 1976. That group took their name from the name of the alien ambassador in the 1951 film *The Day the Earth Stood Still*.

Chapter two is not all about pre-Barker history. It describes how Barker's interest in UFOs was kindled by an event in 1952 in Flatwoods, West Virginia, only twenty-nine miles from his home in Riffle. A fireball was seen, and residents reported some sort of monster shortly thereafter. Barker went to Flatwoods to investigate. His embellished report was printed in the January 1953 issue of *Fate* magazine. Following his *Fate* publication, Barker started on his life-long hobby/career as a UFO investigator, writer, and publisher.

As the next several chapters make clear, Barker was a major player, for good or ill, in the UFO culture through the 1950s into the 1970s. A revelation in chapter four is that the famous feud between Barker and James Moseley (1931–2012) was a hoax to sell their publications. Following the excitement generated by the 1947 Arnold sighting, individuals came forward to report that they had been contacted by benevolent "space brothers" whose mission was to inform the people of Earth of their advanced extraterrestrial civilizations and to bring messages of peace and hope to earthlings. The classic sci-fi movie *The Day the Earth Stood Still* was based on this idea.

I've always found it puzzling that these super advanced aliens chose to communicate with individuals who, to put it mildly, would not have been the most effective communicators of their message and never appeared in venues where their message would be clearly heard. The supposed abduction of Betty and Barney Hill in northern New Hampshire in 1961 changed the theme of alien contacts from that of the contactees to that of the abducted. The abducting aliens were far from benevolent. They sometimes had sexual relations with their victims. They performed unpleasant medical procedures, including attempts to produce human alien hybrids.

The switch from the benevolent to the evil aliens split the UFO community. McKee's book places Barker in the context of those changes. The more conservative UFO organizations had long rejected the contactees. Prime among these was the National Investigations Committee on Ariel Phenomenon (NICAP) formed by UFO writer Donald Keyhoe in 1956. NICAP tried to persuade the government to release all the "secret" documents it had relating to UFOs and get Congress to hold hearings on UFOs. The organization lasted until 1980. (Full disclosure: I was a member of NICAP while in high school in the mid-1960s.) Other groups jumped on the abduction bandwagon. Barker played along, describing the alien human sexual encounter that supposedly took place in Brazil in 1962 in his 1965 book *Gray Barker's Book of Saucers*. McKee uncovered fragments of a manuscript in the Barker archives that contained a longer, apparently more explicit, description of this sexual encounter.

In the late 1960s, University of Colorado Professor Edward Condon (1902–1974) directed an investigation of UFOs funded by the U.S. Air Force. The Condon Report, published in 1968, concluded that there was no evidence these were extraterrestrial. McKee notes that the report "resulted

in the collapse of the reigning metanarratives about UFOs" (p. 207)—that they were craft of kind and gentle extraterrestrials. This collapse ushered in the era of abusive alien encounters noted above. McKee discusses the alien abductee phenomenon and its influence on, and by, films such as *Close Encounters of the Third Kind*. In a long footnote (pp. 293–294), he cites numerous publications from the "voluminous" and "scholarly literature" on alien abductions. However, he amazingly does not include Susan Clancy's 2007 book *Abducted*, the definitive investigation of the psychological processes that lead to abduction experiences.

By the 1970s, Barker had become, if not a skeptic, certainly more aware of the problems within the UFO community. In a 1980 letter to UFO skeptic Robert Sheaffer, he wrote "I AM thoroughly dedicated to promoting UFO crackpottery" (capitalization in the original) (p. 210). In a similar vein, he distanced himself from the extraterrestrial hypothesis that had failed to yield supporting evidence following scientific investigations. Rather he favored theories such as that of Keel that held that UFOs were some sort of extra-dimensional phenomenon. He went further, at one point in a 1980 publication writing that UFOs "should be more closely studied by the sociologist [and] the psychologist" (p. 210). Ironically, Barker was right about this, but not for the reasons he thought. It has been research on memory and perception, as well as fantasy prone personality types, that have helped to explain UFO sightings and abductions that the "nuts and bolts" extraterrestrial hypothesis could not explain. Barker's change of approach brought him into conflict with those who studied the problem from a strictly scientific angle, such as astronomer J. Allen Hynek. McKee notes that "Hynek's serious and scientific approach had always clashed with Barker's freewheeling mischievousness, and Barker seems to have resented the astronomer's growing success" (p. 203).

Barker died in 1984, leaving a legacy of confusion about his true ideas. McKee concludes that his influence was "enormous … affecting the rhetoric of the UFO literature more than its substance" (p. 222). Here I would disagree. Barker really helped create the Men in Black, the Philadelphia Experiment, and Mothman. That's much more than rhetoric. McKee's book is an excellent biography of Barker that shows his impact on popular culture. It is a scholarly tour through the UFO culture and community from the late 1940s through the early 1980s. It is heavily referenced, with sixty-seven pages of detailed notes and a thirty-four-page bibliography. Of special interest to students of the UFO movement during this period are the several archival sources that McKee consulted. Especially worth mentioning is the "Gray Barker UFO Collection" at the Clarksburg/Harrison (WVA) Public Library, which contains "29 drawers of file folders, 300 books" (https://www.clarksburglibrary.org/barker-collection) and other material, including personal correspondence, magazines, and even "props" he used. ■

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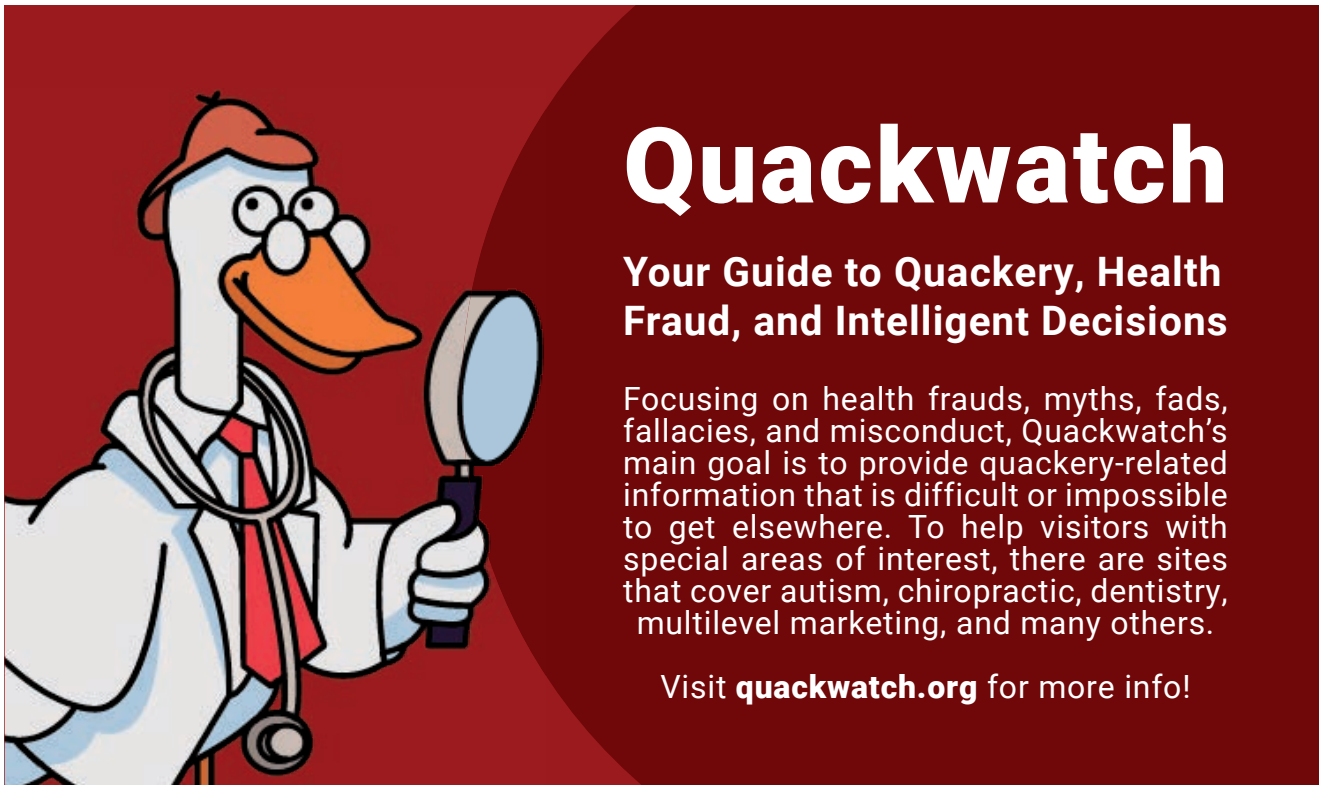
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REVIEW]

Delusions and False Beliefs: A Dark Cautionary Tale

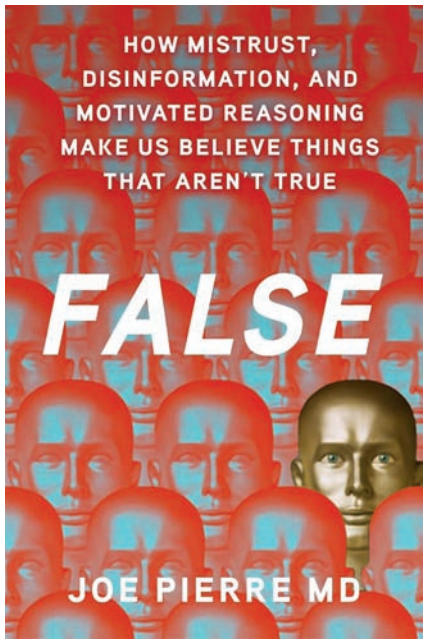
Brian Kerby

Joe Pierre, MD, is a psychiatrist and professor with a decades-long interest in false beliefs. He was featured in *Behind the Curve*, the documentary examining the flat-earther phenomenon. In his new book *False: How Mistrust, Disinformation, and Motivated Reasoning Make Us Believe Things That Aren't True*, Pierre not only explains how cognitive pitfalls make us susceptible to false beliefs but also provides a heuristic to help us mitigate—and perhaps avoid becoming victims of—our own biases. He uses academic research and anecdotes from his practice to support his argument, emphasizing that we can all be vulnerable.

In the first two chapters, he discerns between delusions, false beliefs (including "healthy lies we tell ourselves"), and how both expertise and ignorance can lead to over- and under-confidence. He differentiates *delusion* from *false belief*, with the former being self-referential and the latter being shared among many. Pierre clarifies with examples, including the shared false belief that alien abductions are happening (to others) compared to the delusion that the believer has been abducted.

In other chapters, he notes several cognitive biases and logical fallacies. He discusses the decline of trusted network news into cable news and talk shows. Combined with digital media and some scientific and medical journals, the result is a "Flea Market of Opinion" masquerading as information. Pierre also exposes the business of disinformation.

He then turns to conspiracy theories, noting that they fill our psychological need for certainty, closure, and control—his "three C's." Using an anecdote from his teaching career, he illustrates quite effectively that we *all* can be susceptible. Years after September 11, 2001, he assigned one medical student to investigate the 9/11 "inside job" conspiracy theory and another to find evidence refuting the claims. Both were to search YouTube for sources. When they then presented their arguments, they were each convinced by what they found, neither acquiescing to the other's position. Despite being well matched in education, politics, and intelligence, they both displayed confirmation bias, motivated reasoning, and failure to acknowledge counterevidence.



False: How Mistrust, Disinformation, and Motivated Reasoning Make Us Believe Things That Aren't True. By Joe Pierre. Oxford University Press, 2025.

"Falling for Bullshit" is next, with more examples of susceptibility, including that of those in academia and otherwise science-minded people. Pierre also examines how identity politics, sectarianism, perceived threats to the status quo, and other issues are driving wedges in society. The last chapters provide analysis and prescription.

He unpacks the reasoning behind why beliefs should change with evidence. "The reason we should trust science is because of its willingness to be wrong" (p.158). We also should go with the best available information and update our beliefs as warranted. Facts may change, but that doesn't beget post-modernism, post-truth, or relativism. Truth may be elusive, but it's not illusive.

The final chapter offers remedies. Pierre's "Holy Trinity of Truth Detection"—intellectual humility, cognitive flexibility, and analytical thinking—is prescribed for individuals. Regarding society, education reform may be necessary, and he reminds us that free speech does have limits, acknowledging arguments for some "content moderation, censure-ship, and censorship" (p. 183). He also reiterates that we *all* need to be aware of our biases and be willing to move on from simply dividing the world into a binary "who's right and who's wrong" paradigm. Instead, it's better to evaluate evidence together with those who disagree to find a way forward. However, Pierre is no Pollyanna and leaves us with the stark and unfortunate observation that there is no assurance that enough people can set bias and ideology aside to save truth from disinformation.

False is well written, though I did think there were opportunities for more exploration. I was left curious where mass psychogenic illness fits in among in the delusions versus shared false beliefs categorization. Regarding the willingness of science to change and never declare certainty, it might have been favorable to mention John Cook's five techniques of science denial (fake experts, logical fallacies,

impossible expectations, cherry picking, and conspiracy theories) because each might contribute to false beliefs (Pierre does reference the academic work of Cook and others, but not every reader will look to the endnotes, much less read the work referenced).

Overall, the book is an informative read written by someone deep in the trenches of delusions and false beliefs. Pierre doesn't pull any punches; *False* is more a "dark cautionary tale than inspirational fantasy" (p. 190). ■

Brian Kerby is producer and host of the nationally syndicated public access show *502 Conversations*. He has an MMus as well as an MEd in science and the public.

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Visit skepticalinquirer.org or scan the QR code to listen to Joe Pierre's episode on *Skeptical Inquirer Presents*!

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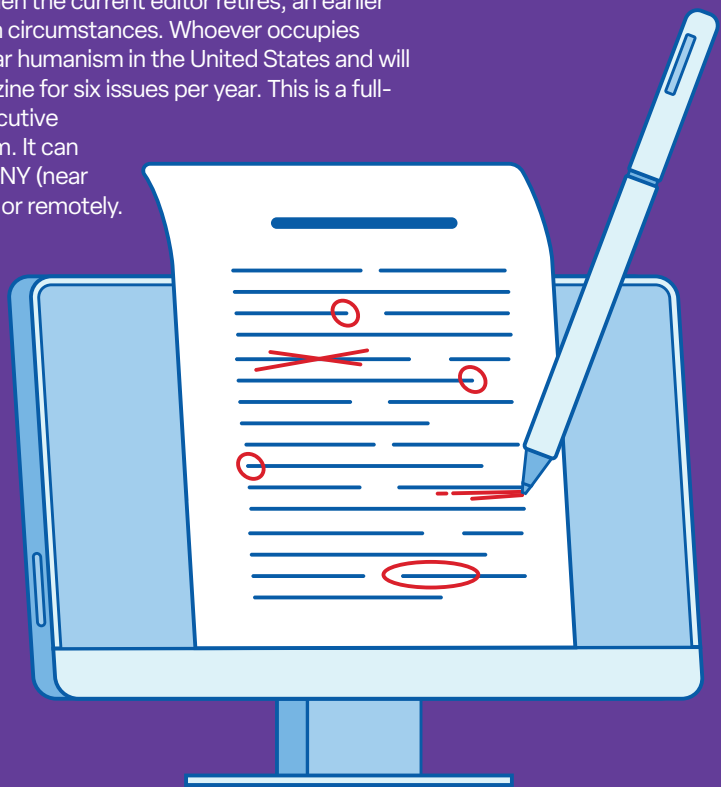
The Center for Inquiry is looking for a new editor for *Free Inquiry*. The new editor will start on or about September 1, 2026, when the current editor retires; an earlier start date may be negotiated, depending on circumstances. Whoever occupies this position will be a leading voice for secular humanism in the United States and will establish the editorial direction of the magazine for six issues per year. This is a full-time job that also includes duties as the executive director of the Council for Secular Humanism. It can be done from our headquarters in Amherst, NY (near Buffalo), at CFI West offices in Los Angeles, or remotely.



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Chemophobia

In the November/December 2025 article on chemicals and "chemophobia," Andrea Love presents a surprisingly one-sided perspective for a publication committed to scientific skepticism. The term *chemophobia* has historically functioned as a rhetorical device employed by representatives of the chemical industry to dismiss legitimate concerns regarding the release of hazardous substances into the environment. This very relevant connotation is not acknowledged in the article.

Love's treatment of the subject appears to minimize the risks associated with industrial and synthetic chemicals, while emphasizing the dangers of certain natural substances such as botulism toxin. This framing neglects the extensive record of harm caused by industrial chemicals. In my professional experience in occupational health and safety, I have repeatedly encountered manufacturers and users of toxic substances who sought to obfuscate, deny, or diminish the well-documented health effects of these chemicals on workers and surrounding communities.

The toxicological literature provides ample evidence of serious health effects in chemicals ignored or denied by their manufacturers. Tetraethyl lead, asbestos, lead, crystalline silica, benzene, and methylene chloride are but a few examples. These substances were developed and promoted with profit and utility as the primary considerations, while their deleterious effects on human and environmental health were minimized. When the adverse consequences became undeniable, industry-initiated public relations campaigns and pseudoscientific arguments were designed to resist regulation, avoid responsibility for negative effects, and undermine credible scientific findings. The charge of "chemophobia" became a convenient means of discrediting advocates and regulators who sought to protect public health.

Rafael Moure-Eraso, PhD
Emeritus Professor of Public Health-UMASS Lowell
Medford, Massachusetts

Andrea Love responds:

I would like to thank Rafael Moure-Eraso for these comments and for the opportunity to clarify what my article did and did not argue.

Chemophobia *isn't a term used to discredit regulators or shield industry from accountability. It describes a well-documented pattern in public risk perception: treating "synthetic" as inherently dangerous and "natural" as inherently safe, independent of dose, exposure, or evidence. Chemophobia overlaps familiar fallacies, such as the appeal to nature, and it has real—and detrimental—consequences. It causes unfounded fears, influences consumer behaviors, drives unscientific policies, forces reformulation of products, and ultimately harms public health.*

Several of the provided examples, such as asbestos, lead, and crystalline silica, are natural chemicals. Their associated harms didn't come from their mere existence but rather failures of regulation and worker protections upon extraction, concentration, and widespread use. By the same logic, the mere existence of a synthetic chemical does not make it dangerous. Toxicology determines risk, not whether a substance is natural or synthetic. The examples provided by Moure-Eraso underscore the need for rigorous, science-based oversight, not replacing risk assessment with ideology. On a personal note, as a scientist who works in the biomedical field, I am a huge proponent of science-based regulation—not policies grounded in misinformation.

My article doesn't minimize documented instances of industrial negligence around hazardous substances. In fact, I used examples to underscore the nuance required to distinguish between large-scale high-dose exposures and trace-level, real-world use—both of which are grounded in evidence-based risk assessment. Scientific skepticism must go both ways: you can question corporate claims, but you must also question cultural narratives that treat chemistry itself as a villain, regardless of evidence.

Randomized Controlled Trials

Charles Paxton's excellent article "Weird Things Some Scientific Skeptics Say about Science" (November/December 2025) unfortunately devotes only a few lines to Claim #6 that "Proper Science Uses Randomized Controlled Trials" (RCTs). In my own field of clinical psychology, the admirable search for evidence-supported psychotherapies has been misled by the glorification of very weak and poorly controlled RCTs.

The RCTs supporting such pseudoscientific therapies as emotional freedom techniques (EFT) and thought field therapy (TFT) have used only waitlist control groups, which, we have known since the uncovering of the Hawthorne effect, prove absolutely nothing. *Everything*—including custard therapy—works better than a waitlist control due to expectancy effects, attention effects, etc.

Also, the control groups in RCTs need to control for *everything but* the putative active ingredient in the therapy being examined. EFT and TFT are "purple hat therapies" in that they incorporate known effective therapeutic elements such as imaginal exposure, cognitive processing, and distraction along with their special, magical claimed-effective element, which in this case is tapping on acupuncture meridians. When controls have been administered, such as the whole EFT procedure but with tapping on non-meridian points or on a doll (sham EFT), this has been found to be just as effective.

So currently acceptable RCTs in clinical psychology can be very poorly controlled and therefore may prove almost nothing.

Gary Bakker
Launceston, Tasmania, Australia

Editor Stephen Hupp responds:

As a clinical psychologist, I generally agree with the points made in Gary Bakker's letter, and I'm always thankful for the opportunity to highlight the pseudoscientific nature of treatments such as EFT and TFT. Also, letters to the editor that incorporate the term purple hat therapies *are especially welcome (see the article by Rosen and Pankratz in the September/October 2024 SI for more on that topic).*

I'd also like to add that since the 1990s, the American Psychological Association has explicitly prioritized the value of RCTs with active control groups as part of the identification of "well established" empirically supported treatments. In fact, as suggested previously by skeptics such as Steven Novella and Scott Lilienfeld, this distinction cuts to the heart of the difference between the terms evidence-based *and* science-based. *Concepts such as these are explored in my book* Science-Based Therapy: Raising the Bar for Empirically Supported Treatments *(Hupp and Tolin 2025).*

Evolutionary Medicine

I wanted to thank Nathan H. Lents and Samantha Vee for their compassionate approach to neurodiversity in the November/December 2025 issue of SI. Though only a paragraph, it meant a lot. I am autistic/ADHD and a licensed clinical social worker, attempting to do my best to

use empirical research and evidence-based practice.

The concept that in a different age, non-neurotypical humans brought (and continue to bring) valuable contributions to society is so important and humanizing for my community.

As mentioned in the article, often a neurodivergent individual grows up a square peg trying to be jammed into a round hole. Don't whittle down the person into a round peg; create more holes!

In case it isn't clear, being mentioned in research and articles by reputable sources is so powerful in shaping how neurodiversity is perceived and narratives surrounding the "value" of any given person in general. If we all had the same neurotype, our society would lose so many valuable features. Onward!

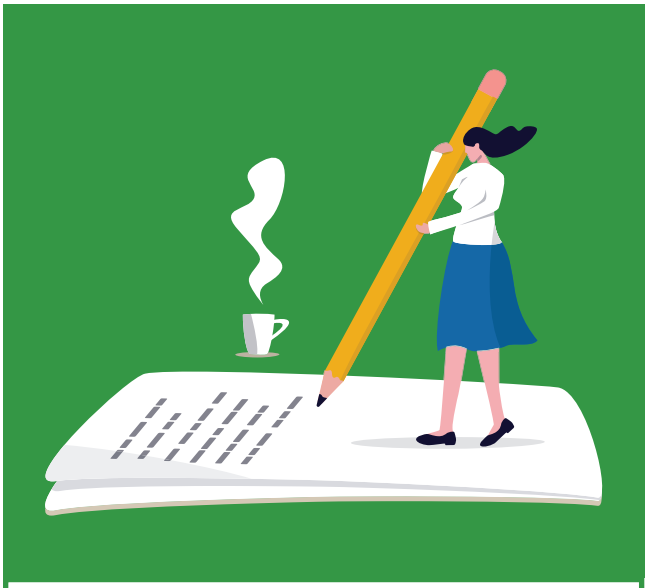
Lauren Malamed, LCSW
Birchrunville, Pennsylvania

Nathan H. Lents and Samantha Vee (November/December 2025 issue) wrote: "evolutionary medicine is the acknowledgement that the anatomy, physiology, and biochemistry of our bodies have deep evolutionary roots and were shaped and adapted to an environment very different from the current one. Therefore, key to the application of evolutionary principles to medicine is an understanding of how our ancestors actually lived, in technical language, the Environment of Evolutionary Adaptedness (EEA)."

However, as Marlene Zuk made clear in *Paleofantasy: What Evolution Really Tells Us about Sex, Diet, and How We Live* (2013), we should not assume that how our protohuman forbears were better adapted to their environments than we are to ours.

Lents and Vee agree with Zuk that our omnivorous ancestors lived in a variety of environments and lived on a variety of diets, but they neglect: (1) how our ancestors lived is largely irrelevant when our traits have quickly evolved in specific environments; (2) natural selection works via survival to reproduce, not to thrive without nutrition-related chronic diseases; (3) how common it is to survive to reproduce on diets high in sugar and cereal crops not available to our ancestors; and (4) how a long-term view of how we have fared nutritionally and socially challenges Jared Diamond's characterization of farming as "the worst mistake humans ever made."

William Matthew London
Thousand Oaks, California



Send in a Letter to the Editor

Letters to the Editor are for views on matters raised in previous issues. Letters should be no more than 225 words. Due to the volume of letters received, not all can be published. Those selected may be edited for space and clarity. Authors criticized in the Letters column may be given the opportunity to respond in the same issue. Submit Letters to the Editor by email text (not attachment) to letters@skepticalinquirer.org. In the subject line, provide your surname and informative identification, e.g., "Smith letter on Jones evolution article." Include your name and location (City, State) at the end of the letter.

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SECRETS REVEALED

Connectivity Answer

Group #1: Craig FOSTER, Andrea LOVE, and Mick WEST are the names of columnists for Skeptical Inquirer.

Group #2: NOTES on a Strange World, BEHAVIOR & Belief, and POSTCARDS From Reality are the beginnings of column titles for SI columnists Massimo Polidoro, Stuart Vyse, and Robyn Blumner, respectively.

Group #3: Together, BEN, RAD, and FORD make up the name of SI's deputy editor and columnist.

What's The Meaning of This? Answer

π = pi (also correct: 3.14 …)

D20 = twenty-sided die (e.g., one of the dice used in Dungeons & Dragons)

= Logo for the Seattle Kraken hockey team (the kraken is a mythical beast)

42 = [Spoiler alert] The answer to the Ultimate Question of Life, the Universe, and Everything (according to *The Hitchhiker's Guide to the Galaxy*)

CSICOP = Committee for the Scientific Investigation of Claims of the Paranormal

Word Noodle Answer

KNOCK
FLOATER
SKEPTIC

REIMAGINE YOUR PHILANTHROPY

Be smart and strategic

Make a bigger impact at less cost to you

Donor Advised Funds
Donate and recommend grants

Qualified Charitable Distribution
Transfer from your IRA directly, and optimize your taxable income.

Stocks
Gift stocks, potentially avoid capital gains, and magnify your impact.

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